

City of Whitewater

Wisconsin

Fire and Emergency Medical Services Evaluation

Summer 2013

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Stephanie Abbott, Aldermanic District 2	Patrick Singer, Council President (At Large)
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Joe Uselding, Lieutenant	Kelly Freeman, Lieutenant

Rescue (EMS)

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Courtney Bauer, Lieutenant	Rene Monestero, Lieutenant
Shannon Schepp, Lieutenant	Scott Brautigam, Lieutenant

Executive Summary

To be completed by ESCI upon review of the draft document by client representatives prior to publication of final document.

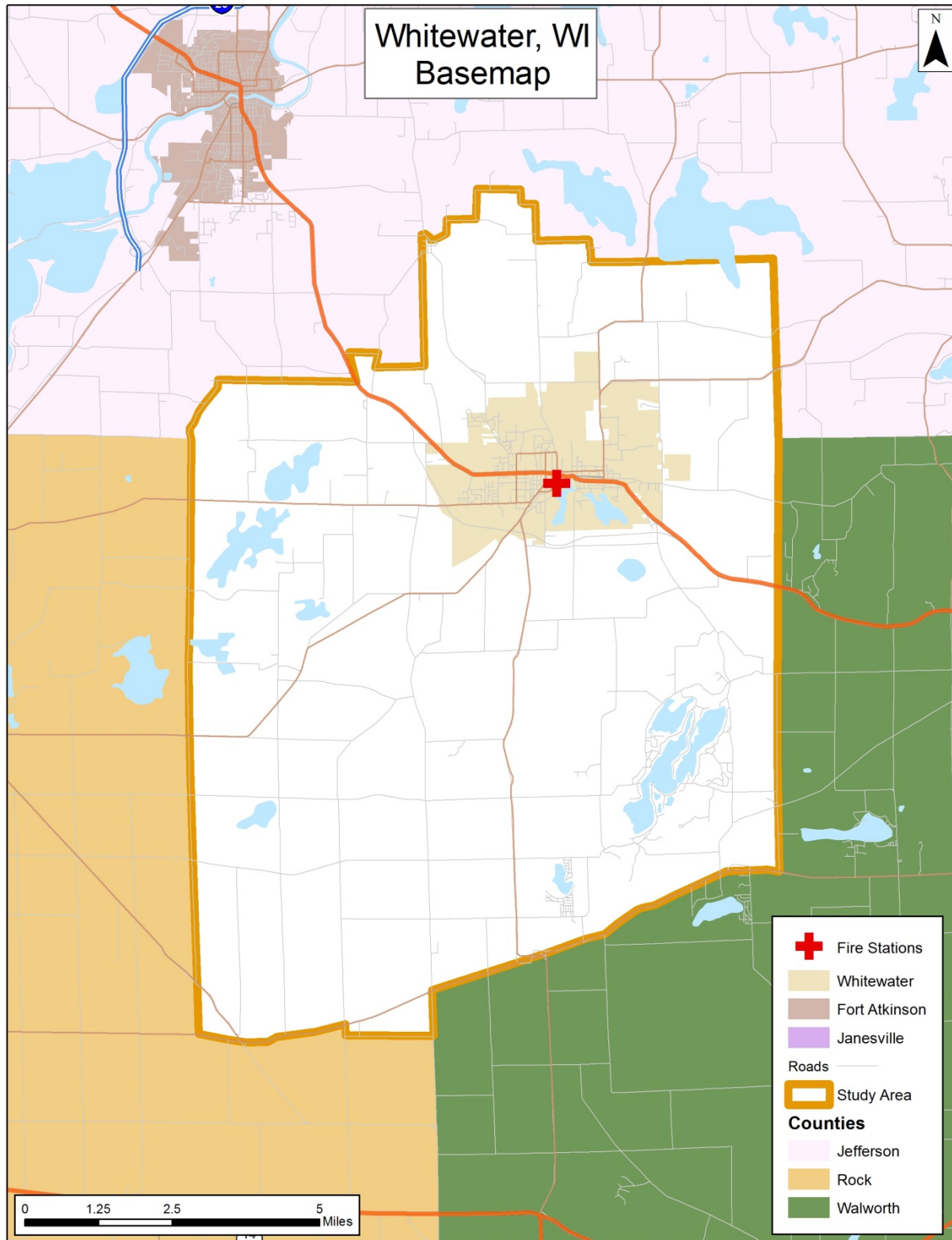
Section I – Evaluation of Current Conditions

Emergency Services Consulting International (ESCI) was engaged by the City of Whitewater to provide an external evaluation of the Whitewater Fire Department (WFD) and to determine how to best plan for future service delivery. This report is the culmination of that evaluation and is presented in three primary sections that answer three basic questions: Where are we now? Where are we going? How do we get there? These are the basic questions of master planning and the intent of this report is to provide the reader with sufficient information such that decisions can be made to ensure that the fire department is able to provide a sustainable system of emergency services delivery well into the future.

Organization Overview

WFD is the primary provider of fire suppression, technical rescue and emergency medical services transport services for the City of Whitewater, Wisconsin and all, or part of, a number of townships surrounding the city. The figure below illustrates the area served by WFD and includes the City of Whitewater, Whitewater Township, Richmond Township, Cold Spring Township, Koshkonong Township, Lima Township and Johnstown Township.

Figure 1: Study Area Base Map



WFD was formed in 1871 as an all-volunteer fire department and continues to provide fire suppression, Advanced Life Support (ALS) ambulance transport, vehicle extrication, surface water rescue, code enforcement, and public education services to a population of approximately 30,649 in an area of approximately 120 square miles. Services are provided from a single station located in the City of Whitewater with a fleet of three engines, one aerial ladder, four ambulances, two tankers, and several ancillary and support vehicles.

As of the writing of this report, the department had approximately 105 members on its roster of active personnel although staff indicates that only 20 percent of those should be considered actively involved in day-to-day responses. The department does not employ part-time or career personnel, but rather relies on paid-on-call (POC) personnel responding from home, work or elsewhere in the community for operational response. Dispatch services are provided through the Whitewater Police Department communications center and technician-level hazardous materials response is provided through a state team.

The primary service area is a mix of urban residential and light commercial, suburban residential and light commercial, rural residential and agricultural, and institutional properties including the University of Wisconsin – Whitewater. Current levels of growth have been described as very limited. The department was evaluated by the Insurance Services Office (ISO) in 2012 and received a rating of 3/8B, which will be discussed later in this report.

Governance and Lines of Authority

Fire departments across the United States are designed in a number of ways including municipal/county, taxing district, joint powers authority (JPA) and dependent districts. Departments that are municipal or county in their structure are governed by and report to either an appointed municipal/county executive or an elected board of commissioners/councilors. Funding is received primarily from ad valorem taxes, grants and other sources. Taxing districts are quasi-governmental organizations that have been given special authority to organize as a taxing entity for the purposes of providing emergency services to a specific geographical area. This type of department is separate from the other governmental entities that it may provide services to and receives its funding from its own ability to levy ad valorem taxes. Taxing districts are governed by a board of directors that are usually elected from the geographic area served.

JPA's take the previous two models and, in essence, combine them. JPA's are typically the result of a consolidation of two or more departments into a single entity that is governed by appointed representatives of the geographies/governments protected. JPA's receive their funding from the original government entities and do not have taxing authority. Dependent districts are departments that provide emergency services through contract with governmental units, as is the case in Whitewater. These types of departments do not have taxing authority and receive their funding through provisions of a contract as well as other methods including grants, donations and formal fund-raising efforts. Most of these dependent districts are organized as not-for-profit, membership corporations so that donors can take a tax deduction.

WFD falls into the last of the organizational structures described above. During review of documentation, however, ESCI discovered that the department is not registered with the State of Wisconsin as a not-for-profit corporation or any other type of corporation for that matter. In addition, the contracts in place between the department and the municipalities being served are hit-or-miss.

In essence, the townships contract with the fire department for fire suppression; the townships contract with the city for ambulance services; the city contracts with the fire department to provide both fire suppression and ambulance services; all personnel are members of the private group but are also considered city employees; the city owns a majority of the apparatus and equipment (remainder owned by the fire department); the city owns the facility; the city pays for all insurance for the fire department (by ordinance)...but no contract exists between the fire department and the city.

Internally, the fire department's organizational structure is just as disjointed. The fire department is managed by a Fire Chief and two Assistant Chiefs that are elected by the membership (members that are only part of the Rescue Squad have historically not been allowed to vote on the Chief Officers). The Chief Officers then appoint all Captain and Lieutenant positions across the three departmental divisions: Fire, Crash (Technical Rescue) and Rescue (EMS). In other words, although 'Rescue' personnel comprise 60 percent of the organization, they have not been allowed to vote for the one position that will then appoint the Rescue Captain. While this is reported to be changing at the upcoming elections in January 2014, ESCI would recommend that the practice of electing officers be abandoned and a system of appointment by a governing board based on minimum qualifications and experience be implemented.

Although the recommendation above suggests that a governing board be used to appoint the Chief Officers, no such governing board currently exists. The governance of the fire department is in the hands

of the Fire Chief, Secretary, Treasurer and 1st Assistant Chief. Considering the private nature of the organization, the city does not have any governance authority or oversight capability in regards to the fire department. If all department personnel are to be considered city employees and the city has accepted the liability associated with that designation, then the city should be actively involved in the human resources element of the organization. Short of this involvement, the city should consider severing its human resources relationship with the department in order to reduce personnel related liabilities.

Recommendations:

- The department should abandon the practice of voting for Chief Officers and appointing line officers and implement a system of promotional testing for all positions.
- The city should work with the department to become more involved in the human resources element of the organization. If this cannot be accomplished, the city should sever its relationship with the department regarding personnel issues and classifying department members as city employees.
- The Police and Fire Commission should be leveraged to act as an unbiased board for assistance with human resources needs.

Foundational Policy Documents

All organizations must have at least a minimum set of documents and/or policies and procedures that dictate how the organization functions under a variety of circumstances. For an emergency services provider, these foundational policy documents can take on many forms. Most emergency services providers have a basic set of Standard Operating Guidelines/Procedures (SOP/SOG) as well as potentially also having by-laws, employee manuals, training manuals, checklists and annual performance evaluations.

For WFD, these policy documents begin with Chapter 2.24 of the City of Whitewater Code of Ordinances. These documents identify how the fire department will be structured in regards to duties, responsibilities and authorities of its officers as well as require that the city pay for all insurance related to the provision of emergency services within the fire department. Nowhere in the ordinances does it indicate any oversight authority by the city.

The second document that governs the operation of WFD is a set of bylaws that have been adopted by the organization. Bylaws are, in their simplest form, rules by which an organization is formed and

functions. The bylaws in place for WFD have been modified or otherwise revised numerous times since their original publication. At present, although WFD is a single private organization, the bylaws are separated into three sections; fire, rescue and crash. These three sections are starkly different and contain major flaws related to overall organization continuity.

The 'Fire Department' bylaws focus on the requirements of membership into the organization, election of officers, duties and responsibilities of officers and meeting organization. This section of the bylaws allows for regular members and honorary members that have retired from WFD in good standing. Several times throughout the 'Fire Department' section of the bylaws, the 'Rescue' section is mentioned in that the Rescue Captain sits on the 'Fire Department' Review Board and participates in other activities. Part III of the full set of bylaws pertains specifically to 'Rescue.' Section I of Article I – Membership states, "...every person who meets the qualifications of, has been accepted into, and participates in, the branch of the Whitewater Volunteer Fire Department that is commonly referred to as The Whitewater Rescue Squad...is a member of the Whitewater Volunteer Fire Department."¹ Given this direction, the voting issues discussed previously should be abolished.

Like the 'Fire Department' bylaws, the 'Rescue' bylaws focus on voting, membership and duties and responsibilities of officers. One difference in the membership area is that 'Associate' members are allowed as part of the rescue division. These members do not have voting privileges and are not subject to the same attendance requirements as regular members. The 'Crash' bylaws are very similar to those of the rescue division in that they contain separate membership requirements. Of note, however, is that to be a part of the 'Crash' crew, a person must also be a member of the 'Fire Department.' In other words, a 'Rescue' member (which by bylaw is also a fire department member) cannot be a 'Crash' member without first being voted on by the fire department. Given the lack of continuity of the current constitution and bylaws, ESCI recommends that the entire document be rewritten as a cohesive set of rules and regulations that govern the entire organization.

The policy document in use within WFD is their Standard Operating Guidelines. This set of documents is considered to be a living and dynamic manual that is constantly under review and revision as the need arises. The United States Fire Administration (USFA) has prepared a guide to assist department with developing effective SOG/SOP manuals and provides a sample list of recommended topics to include. Major section recommendations include:

¹ Whitewater Fire Department Bylaws. Part III, Section I, Article I – Membership.

- Management and Administration
- Prevention and Special Programs
- General Emergency Operations
- Fire Suppression
- Emergency Medical Response
- Hazardous Materials Response
- Technical Rescue
- Disaster Operations

WFD's SOG manual is well-organized and reasonably up-to-date. While the manual does not contain all the areas recommended by the USFA, the department has done a good job at creating a document that provides for sufficient administrative and operational guidance.

Recommendations:

- ESCI recommends that the current Constitution and Bylaws for the Whitewater Volunteer Fire Department be rewritten to establish a single set of cohesive rules and regulations for membership, rules and regulations and disciplinary actions.

Strengths, Weaknesses, Opportunities, and Challenges

Formal organizations must periodically stop and perform a self-evaluation if they desire to remain relevant in today's society and in line with industry standards and expectations. Emergency services organizations are no different. In many respects, fire departments and EMS groups must continually evaluate themselves due to the rapid way in which the industry is changing. Part of that internal evaluation is called a SWOT analysis where strengths, weaknesses, opportunities and challenges/threats are determined. Strengths and Weaknesses are those elements that are usually internal. In other words, a department itself has strengths and weaknesses that are not controlled by external forces. Based on interviews with department personnel, the following strengths and weaknesses were voiced by leadership.

Strengths

- Condition of apparatus and equipment
- In-House training has improved
- Dedicated staff with a variety of demographics and ages

Weaknesses

- Staffing, particularly during daytime hours
- Cooperation/Communication between divisions is poor
- Response Times
- Holiday coverage
- Location is not conducive to public interaction

Opportunities and challenges/threats are those external issues that impact the organizations ability to deliver services. They are, many times, elements that are outside of the control of the organization and require modifications to historical methods in order to reduce their impact. Although ESCI did not question department leadership on their perception of external opportunities and challenges/threats, the project team did recognize some prominent issues that will impact the organization as it continues to grow and evolve.

Opportunities

- The city is supportive of the organization and desires a sustainable model for the future
- Potential for joint/shared services with other providers to further reduce costs of equipment, training, etc.
- Student population at University of Wisconsin – Whitewater could be tapped for more resources
- Young, general population lends itself to more of a volunteer spirit
- Community does not realize that the department is purely volunteer/paid-on-call

Challenges/Threats

- Growing population on the University of Wisconsin – Whitewater that changes risks seasonally
- Potential for loss of volunteers in the future as training requirements increase and coordination between department divisions declines
- Change is always difficult but sometimes necessary. Managing that change affectively will make the different in the outcome
- Growing populations will only increase the stress already placed on volunteer/paid-on-call personnel

Recommendation:

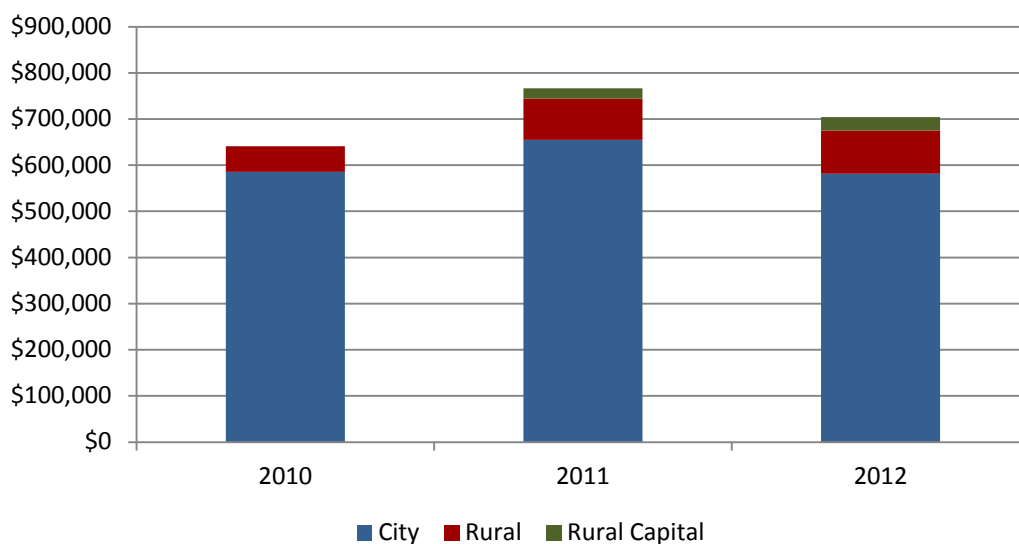
- The department should work with the city to develop a formal strategic plan to identify mid-term goals and objectives that address the department's strengths, weaknesses, opportunities and challenges/threats.
- All department officers should meet monthly to establish short-term goals for the future and report on the status of those goals at the subsequent meeting.

Funding, Fees, and Taxation

Regardless of organization type, size, function, or purpose, money is necessary to keep services in place. As discussed previously, this funding can come from a variety of sources. For emergency services organizations, funding is most typically provided through ad valorem taxation either directly or by contract with a municipality for which services are provided. In the case of WFD, revenue comes from the City of Whitewater, contracts with the townships, donations and interest/dividends on investments.

Since the department is a private organization and no contract is currently in place between the city and the fire department, there is nothing that can compel WFD to release its financial records for audit or review. The department did, however, provide ESCI with three years of expenditure data from accounts that receive revenue from other sources than the City of Whitewater. The figure below illustrates that total cost of operation of the department over the last three years.

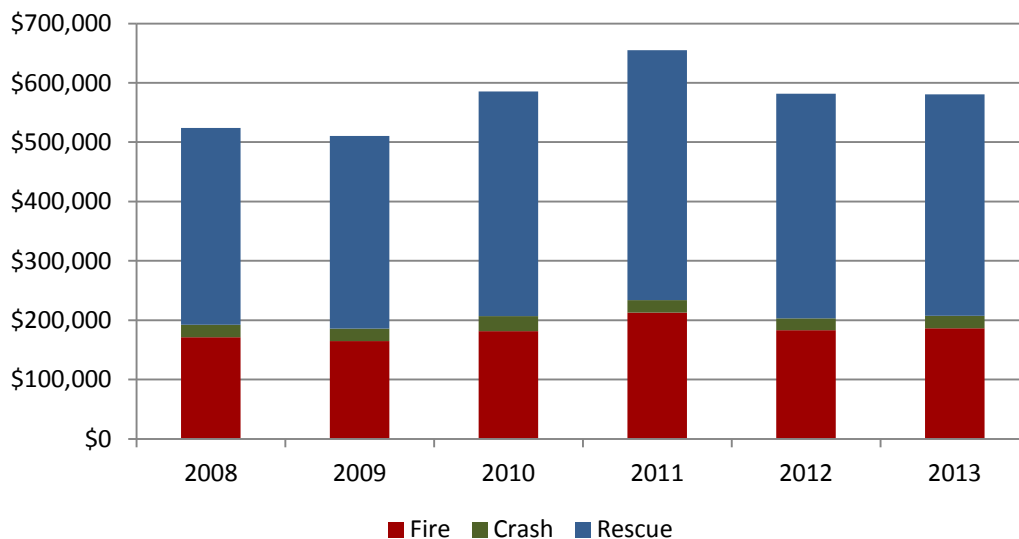
Figure 2: Historical Expenditures



As can be seen in the figure above, a majority of the department's operating budget comes from the City of Whitewater. All personnel costs are paid by the city as well as all insurance costs associated with the operation of the department. Expenses incurred during rural area responses and inspections as well as other ancillary, non-operational costs are budgeted in the fire department's general fund.

City funding is segregated into the three department divisions as illustrated in the following figure.

Figure 3: Historical Budget Distribution - City Funding



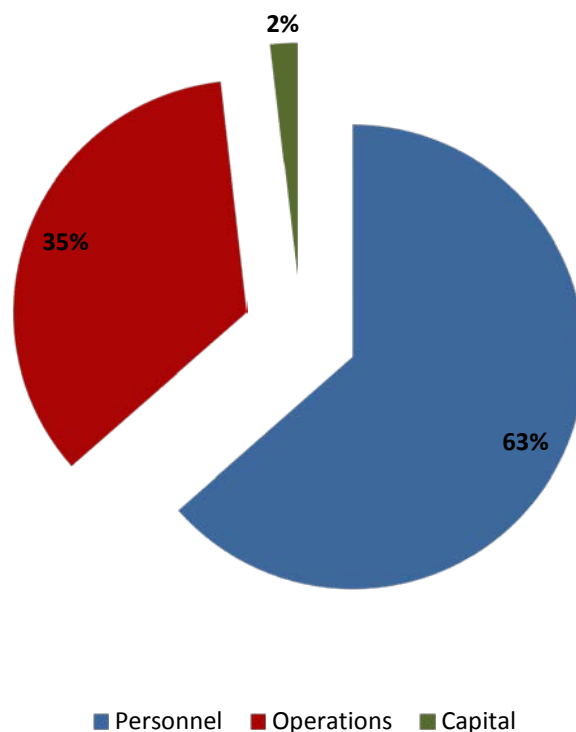
As expected, a majority of the department's expenditures are focused on 'Rescue' or the delivery of transport ambulance services. As will be seen later, this component of the organization comprises a majority of the department's workload, thus a majority of its resources.

In regards to revenue, WFD generates income from a variety of sources including the City of Whitewater's general fund, contracts with the townships, donations and other miscellaneous sources. While a vast majority of the department's overall operating revenue (82.6 percent) comes from the City of Whitewater, the city is not privy to the department's other sources of revenue and cannot make budgetary decisions based on the department's reserves or potential annual revenue from other sources. Despite this fact, the department has historically used the city's federal tax identification number to claim tax exempt status. Although ESCI is not in a position to offer a legal opinion as to this practice, the project team would recommend that the city consult legal counsel in this regard. In

addition, since the city's federal tax identification number has been used, the city should ensure that the proper taxes have been filed by the department to ensure that the city's liability is limited.

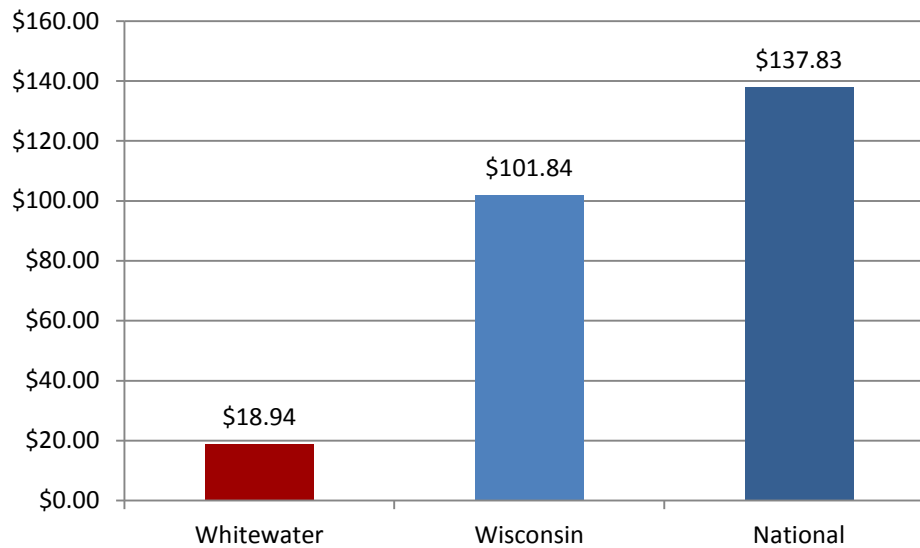
Although WFD is a volunteer/paid-on-call department, personnel are compensated when they respond to incidents or complete special duties. The rates of pay and system for compensation will be discussed later in this report. The figure below illustrates how the department's budget is segregated across the three primary categories of personnel, operations and capital.

Figure 4: Budget Distribution - City



As discussed above, personnel are compensated for incident response and special duties. The distribution in the figure above is not uncommon for a department of this size. The final comparison of costs to operate WFD is that of cost per capita.

Figure 5: Cost per Capita Comparison



Based on this comparison, WFD is significantly below the Wisconsin and National averages in per capita spending. It should be noted, however, that the benchmark data does not differentiate between those departments that utilize career personnel versus volunteer/paid-on-call personnel. This comparison also does not separate out revenue generated from services delivered such as EMS transport and only focuses on total budget as compared to total population served.

Recommendation:

- The city should consult legal counsel on the department's practice of using the cities federal tax identification number to claim tax exempt status.
- The city should ensure that the department has accurately filed the appropriate tax forms for a reasonable historical period.

Capital Assets and Capital Improvement Programs

Aside from personnel, capital assets can be a department's most critical expense; without proper upkeep and replacement planning, facilities and apparatus can fall into disrepair and fail at a critical time. This section evaluates the capital assets of WFD and provides recommendations for replacement as necessary.

Facilities

Fire stations play an integral role in the delivery of emergency services for a number of reasons. A station's location will dictate, to a large degree, response times to emergencies. A poorly located station can mean the difference between confining a fire to a single room and losing the structure. Fire stations also need to be designed to adequately house equipment and apparatus, as well as meet the needs of the organization, its workers, and/or its members. It is important to research need based on call volume, response time, types of emergencies, and projected growth prior to making a station placement commitment. The following figures summarize ESCI's non-engineering/non-architectural review of each facility within the study area.

Main Station

312 W. Whitewater Street

Built in 1967, this centrally-located community fire station consists of 15900 square foot facility and offers two drive-thru and 3 back-in apparatus bays. Any specific issues or observations with this facility can be classified into the following seven categories.

- **Design:**

The size of the current station is adequate for current use. The exit into traffic is safe and effective, except for the exits to the north that requires apparatus to travel through a privately owned parking lot where there is limited visibility and room for maneuvering. The station, as part of the overall city complex, blends well with its surroundings but is not adaptable for future expansion. Staff parking is only adequate across the street from the station, and there is limited public access. No signage exists to inform the public where the fire station entrance is located and there is no mechanism to alert on-duty members that someone is at the front door. The Emergency Operations Center (EOC) is shared with the police department but offers adequate training space when not otherwise in use. Sufficient storage areas for public education materials and other supplies, and a workout room is located within the facility and is available to all city employees.

- **Construction:**

Concrete block construction with flat/steel bar joist roof in fair condition. No unusual construction features noted other than the loft storage created in the apparatus bay at the back of the building. Heating system is forced air, natural gas, and the building is 100 percent air conditioned with central air. The roof above the apparatus room leaks although a new roof was installed in 2011.

- **Safety:**

No automatic door stops were noted on the apparatus bay doors and the building does not have a sprinkler system. There are smoke/heat monitors throughout but are locally monitored within the dispatch center. Adequate fire extinguishers are placed throughout the facility (not on apparatus). No commercial cooking equipment is present therefore no central cooking equipment shutdown is present. Flammable and combustible materials are stored in approved containers as are all pressure cylinders. The station has a natural gas fired back-up generator with automatic transfer as well as a SCBA compressor with air sample certification up-to-date.

- **Environment:**

A direct connect exhaust removal system is in place within the apparatus bay with evidence of regular use. No underground storage tanks are present and no floor drain oil separates were noted.

- **Code Compliance:**

The facility is not ADA compliant since there is no on-site handicap parking except those areas across the street. There are also no ADA compliant restrooms within the facility. No building code issues were noted other than general cleaning around ambulance linen storage in apparatus bay.

- **Staff Facilities:**

Space for working in, on, or around apparatus is limited due to the large number of apparatus contained within the station. Similarly, space for working with small equipment, hose, and tools is limited. Space for a safe and rapid response is also limited due to the number of apparatus. Space for training is limited to the shared EOC and the station is not meant for on-going staffing and; there are limited areas for personal hygiene and no sleeping areas (with the exception of a large closet that has been converted into a bedroom, which does not offer a secondary means of egress in the case of an emergency

Apparatus

Other than the emergency responders, response vehicles are the next most important resource of the emergency response system. If emergency personnel cannot arrive quickly due to unreliable transportation, or if the equipment does not function properly, then the delivery of emergency service is likely compromised.

Fire apparatus are unique and specialized pieces of equipment, customized to operate efficiently for a narrowly defined mission. For this reason, fire apparatus are very expensive and offer little flexibility in use and reassignment. As a result, communities always seek to achieve the longest life span possible for these vehicles. The following figures provide an overview of WFD's apparatus fleet.

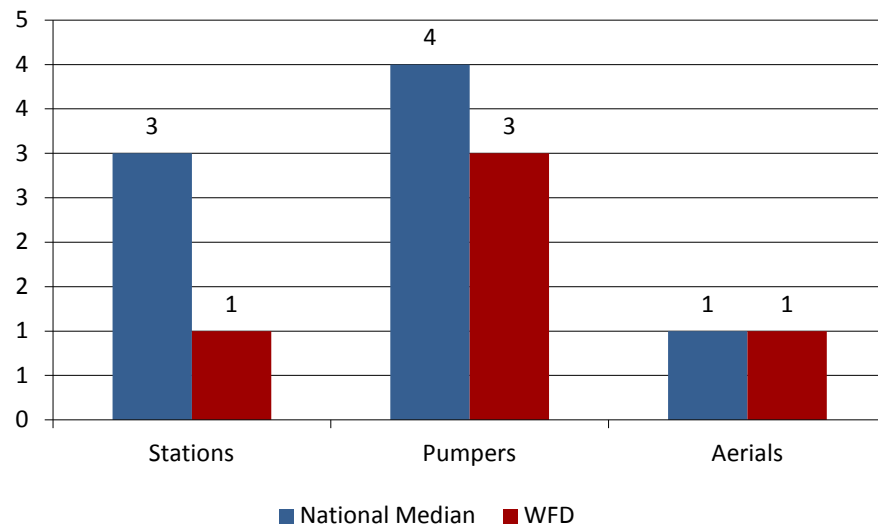
Figure 6: Summary of Major Department Apparatus²

Unit	Year	Condition	Tank Capacity	Pump Capacity	Seating	SCBA
Unit 1221 Engine	2010	Excellent	1,000	2,000	8	5
Unit 1220 Engine	1996	Good	1,000	2,000	8	5
Unit 1223 Engine	1996	Good	1,000	2,000	8	5
Unit 1250 Ladder	1990	Good		2,000	7	6
Unit 1230 Tender	2005	Excellent	4,122	650	2	0
Unit 1232 Tender	2000	Excellent	4,115	650	2	0
Unit 1260 Squad	2004	Excellent	N/A	N/A	8	11
Unit 1240 Brush	2012	Excellent	350	650	3	0
Unit 1274 ATV	2008	Excellent	65	50	2	0
Unit 1281 Ambulance	2005	Good	N/A	N/A	2	0
Unit 1280 Ambulance	2001	Fair	N/A	N/A	2	0
Unit 1282 Ambulance	1997	Serviceable	N/A	N/A	2	0
Unit 1283 Ambulance	2010	Excellent	N/A	N/A	2	0
Unit 1271 Rescue	2010	Excellent	N/A	N/A	8	5

² Apparatus condition as described by department personnel in accordance with condition ratings per Appendix 1.

In comparison to other departments serving similar populations across the country, the department is equally matched regarding the numbers of stations, engines and aerial apparatus as shown in the figure below.

Figure 7: Comparison of Physical Resources



Based on the available benchmark data, WFD is below the national median for both stations and engines/pumpers, but equal to the national median for aerial apparatus. The data used to create this benchmark is published by the NFPA based on peer surveys sent to each fire department identified within the NFPA database. The data is not validated in any way and is only presented here as a means to benchmark WFD based on the available data. The comparison is based purely on population and does not consider geography or type of department (career versus volunteer/paid-on-call) or whether or not the departments provide transport EMS. Further discussion related to distribution of physical resources will be provided in a later section of this report.

Of note here also is that some apparatus within the WFD fleet are redundant due to ownership and historical usage. For instance, some apparatus are owned by the city and are used primarily for 'city' responses while other similar apparatus are owned by the fire department and are used for responses into the townships. These apparatus were purchased primarily with funding received from the townships. While there are certain apparatus, such as tanker/tenders, that are not needed within the city based on hydrant distribution, the department should work with the city on transferring ownership of those assets since the city already pays for the insurance and maintains that equipment. The

following figure identifies the ownership of primary rolling stock and also identifies those apparatus that are considered by ESCI to be redundant.

Figure 8: Apparatus Ownership and Redundancy

Unit	Year	Replacement Cost	Ownership	Redundant	Recommend for Replacement
Unit 1221 Engine	2010	\$550,000	City	No	
Unit 1220 Engine	1996	\$550,000	City	No	
Unit 1223 Engine	1996	\$550,000	FD	Yes	No
Unit 1250 Ladder	1990	\$900,000	City	No	
Unit 1230 Tender	2005	\$340,000	FD	No	
Unit 1232 Tender	2000	\$340,000	FD	Yes	No
Unit 1260 Squad	2004	\$140,000	City	No	
Unit 1240 Brush	2012	\$140,000	FD	No	
Unit 1274 ATV	2008	\$20,000	FD	No	
Unit 1281 Ambulance	2005	\$155,000	City	No	
Unit 1280 Ambulance	2001	\$155,000	City	No	
Unit 1282 Ambulance	1997	\$155,000	City	Yes	No
Unit 1283 Ambulance	2010	\$155,000	City	No	
Unit 1271 Rescue	2010	\$350,000	City	No	

Based on the figure above, ESCI recommends that the city and the fire department work together to reduce the overall fleet size to lower insurance, maintenance and fuel costs and to bring the fleet to a more management level.

Recommendation:

- The city should work with the department to reduce the fleet size by eliminating redundant apparatus, which will reduce insurance and operating costs.
- If the city is going to maintain insurance on all vehicles within the department, the city should be named on the title of each vehicle regardless of where funds came from to purchase it.

Capital Improvement

Fire apparatus are typically very unique and expensive pieces of equipment, often very customized to operate efficiently in a narrowly defined mission. A pumper may be designed such that the compartments fit specific equipment and tools, with virtually every space on the truck designated in advance for functionality. This same vehicle, with its specialized design, cannot be expected to function

in a completely different capacity, such as a hazardous materials unit or a rescue squad. For this reason, fire apparatus is very expensive and offers little flexibility in use and reassignment. As a result, communities across the country have sought to achieve the longest life span possible for these vehicles.

Unfortunately, no mechanical piece of equipment can be expected to last forever. As a vehicle ages, repairs tend to become more frequent, parts more difficult to obtain, and downtime for repair increases. Given the emergency mission that is so critical to the community, this factor of downtime is one of the most frequently identified reasons for apparatus replacement.

Because of the large expense of fire apparatus, most communities have efforts in place to plan ahead for the cost of replacement. To properly do so, communities often turn to the long-accepted practice of establishing a life cycle for the apparatus that result in a replacement date being anticipated well in advance. Many communities then set aside incremental funds during the life of the vehicle so replacement dollars are ready when needed.

While WFD maintains a formal schedule that places all apparatus on any specified replacement cycle from date of primary service, this plan is not fully funded and the length of service of primary apparatus, particularly ambulances should be re-evaluated. Any such program typically works fine for the purpose of fiscal planning, but selecting the life cycle of apparatus can be very difficult. This decision is influenced by many factors:

- Actual hours of use of any specific piece of equipment can vary significantly in comparison to other similar apparatus even within the same fire department. Attempts to shuffle like apparatus among busy and slower fire stations to more evenly distribute hours of use have proven difficult. Frequent changes in apparatus create familiarity and training challenges. In addition, certain response areas may have equipment and tool requirements that are not in common with others.
- Actual hours of use, even if evenly distributed, do not necessarily equate to intensity of use. As an example, a pumper making mostly emergency medical responses will not age as rapidly as a pumper with a high volume of working fire incidents that require intense use of the pump or hydraulics. Likewise, road mileage can also be a poor indicator of deterioration and wear.

- Technology, which is increasingly a factor in fire equipment, becomes outdated even if the apparatus wear is not as significant. In some departments, crews at different fire stations deal with widely different technology on their pumpers based simply on age of the equipment. Like steam engines and modern electric locomotives, these differences can be significant, affecting everything from safety and lighting systems to automated digital pump pressure controls to injection foam generation.

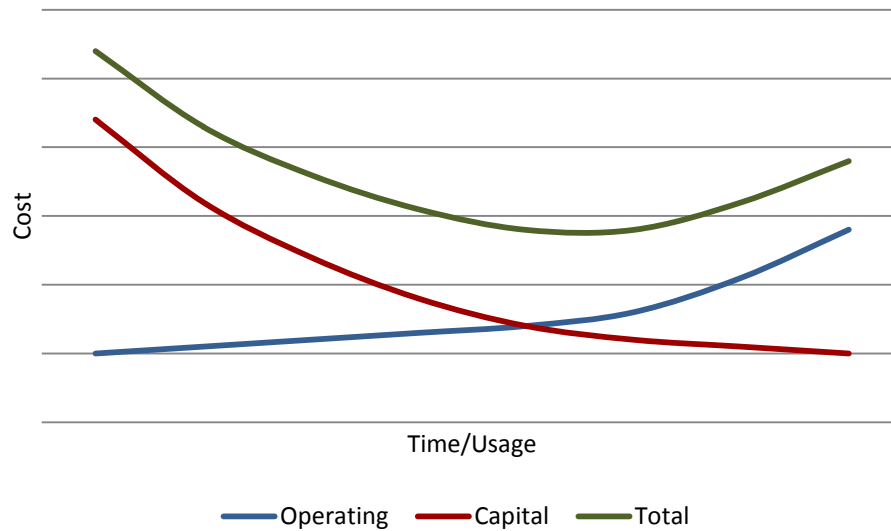
NFPA 1901: Standard for Automotive Fire Apparatus is a nationally recognized industry standard for the design, maintenance, and operation of fire suppression apparatus. The issue of replacement cycles for various types of apparatus has been discussed in the committee that develops the standard for many years. In developing its latest edition, the committee called for a life cycle of 12 years in front-line service, five years in reserve status for engines, 15 years in front-line service, and five years in reserve status for ladder trucks.

Does this mean that a fire engine cannot be effective as a front-line pumper beyond 12 years? A visit to many departments in the United States might prove otherwise. Small, volunteer fire departments with only a hundred or so calls per year often get up to 25 years from a pumper, though the technology is admittedly not up-to-date. Likewise, busy downtown city fire stations in some urban communities move their engines out of front-line status in as little as eight years.

The reality is that it may be best to establish a life cycle that would be used in the development of replacement funding for various types of apparatus, while applying a different method for actually determining the replacement date in real life in an effort to achieve greater cost efficiency where possible.

A conceptual model that may be used when a replacement cycle is considered is the *Economic Theory of Vehicle Replacement*. The theory states that, *as a vehicle ages, the cost of capital diminishes and its operating cost increases*. The combination of these two costs produces a total cost curve. The model suggests the optimal time to replace any piece of apparatus is when the operating cost begins to exceed the capital costs. This optimal time may not be a fixed point but rather a range over time. The flat spot at the bottom of the total curve in the following figure represents the replacement window.

Figure 9: Economic Theory of Vehicle Replacement



Shortening the replacement cycle to this window allows for an apparatus to be replaced at optimal savings to the department. If the department does not routinely replace equipment in a timely manner, the overall reduction in replacement spending can result in a quick increase of maintenance and repair expenditures. Officials who assume that deferring replacement purchases is a good tactic for balancing the budget need to understand that two events may occur:

1. Costs are transferred from the capital budget to the operating budget
2. Such deferral may increase overall fleet costs

Regardless of its net effect on current apparatus costs, the deferral of replacement purchases unquestionably increases future replacement spending needs.

Given the Town's service demand, a life cycle that is longer than the NFPA cycle is recommended for financial planning purposes. In a recent White Paper produced by the Fire Apparatus Manufacturer's Association, the authors surveyed 1,200 fire chiefs from across the country in regards to apparatus condition and usage in an attempt to identify optimum usage and replacement criteria. Of those who responded to the survey, 45 percent were volunteer organizations and 82 percent were serving

populations less than 50,000. Of the total, 48 percent identified themselves as rural. The information in the figures below is an excerpt from that report, specifically focusing on volunteer departments.³

Figure 10: Average Apparatus per Department by Type

Apparatus Type	Average
Pumper/Engine	5.8
Aerial	1.5
Rescue	2.5

Figure 11: Estimated Life Expectancy (Active Service)

Apparatus Type	Average
Pumper/Engine	18
Aerial	21
Rescue	16

Figure 12: Estimated Life Expectancy (Reserve Service)

Apparatus Type	Average
Pumper/Engine	14
Aerial	13
Rescue	11

Figure 13: Estimated Total Service Life (Rural Department)

Apparatus Type	Average
Pumper/Engine	32
Aerial	34
Rescue	27

Figure 14: Average Annual Call Volume

Apparatus Type	Average
Pumper/Engine	780
Aerial	520
Rescue	832

³ Lackore, Roger. *Fire Apparatus Duty Cycle White Paper*, Fire Apparatus Manufacturer's Association, Technical Committee. August 10, 2004.

This information corresponds to call volumes as indicated below. Call volume significantly below the noted averages would tend to lengthen the average service life of all vehicles. The department does not currently have the capacity to maintain reserve apparatus, therefore, the total life expectancy of an engine is calculated using the active service life. Tankers were not evaluated in the reference white paper so an average life expectancy of 20 years was utilized based on the lower call volumes and limited annual mileage typically experienced with tanker utilization.

The information provided is intended to illustrate national trends and is in no way presented here as a standard to equipment replacement. When considering replacement of capital equipment, organizations must bear in mind the typical vehicle usage, climate factors that may shorten life expectancy and overall maintenance issues that tend to increase as vehicles age.

Staffing

Although management and organization of an emergency services agency are key, the personnel that deliver those services are the backbone of the system. Without proper administrative and support personnel to handle supervision, command and control, operational personnel may not be able to perform satisfactorily. This section reviews the staffing within WFD and provides evaluation of the historical staffing performance.

Administrative and Support Staffing

Fire departments that serve large urban areas or large geographic areas and use career personnel often dedicate personnel to the administrative and support functions that allow operational personnel to focus on emergency response. Examples of these dedicated personnel include not only the chief officers responsible for daily oversight, training, fire prevention, etc., but also support personnel such as administrative assistants and clerical staff.

While WFD does provide for some administrative and support roles through the identification of department officer and special appointments, these personnel are also directly involved in operations. Unlike a career fire department, volunteer fire department personnel often wear more than one hat and are required to balance their administrative responsibilities with their operational command and control roles. This is the case for SVFD. Although also serving in operational roles, the positions detailed below have been identified as administrative and support with the organization.

Figure 15: Administrative and Support Positions

Position	Number
Fire Chief	1
Secretary	1
Treasurer	1
1 st Assistant Chief	1
2 nd Assistant Chief	1
Total	5

Those personnel in positions of authority listed above receive various rates of pay above the general firefighter response pay of \$8.00 per incident. The department's officers receive response pay based on the following figure.

Figure 16: Officer Response Pay

Position	Rate
Chief	\$15.00
1 st Asst. Chief	\$13.00
2 nd Asst. Chief	\$11.00

Although the officers noted above do have operational responsibilities, they also have administrative duties that require them to commit additional hours to the organization without additional compensation. Many organizations that compensate personnel for responses also provide officers with an additional stipend to cover their time not attributable to operations. To this end, ESCI recommends that the city/department implement an officer stipend program that compensates those administrative and support personnel for non-operational duties and responsibilities. The figure below should serve as an example but is not intended to represent a final rate of compensation for these positions. That final decision should be made by policymakers.

Figure 17: Example Officer Stipend Rates

Position	Monthly Stipend
Fire Chief	\$500
1 st Assistant Chief	\$400
2 nd Assistant Chief	\$300
Secretary	\$100
Treasurer	\$100

Recommendation:

- The city/department should implement an officer stipend program to compensate officers for their non-operational administrative and support duties and responsibilities.

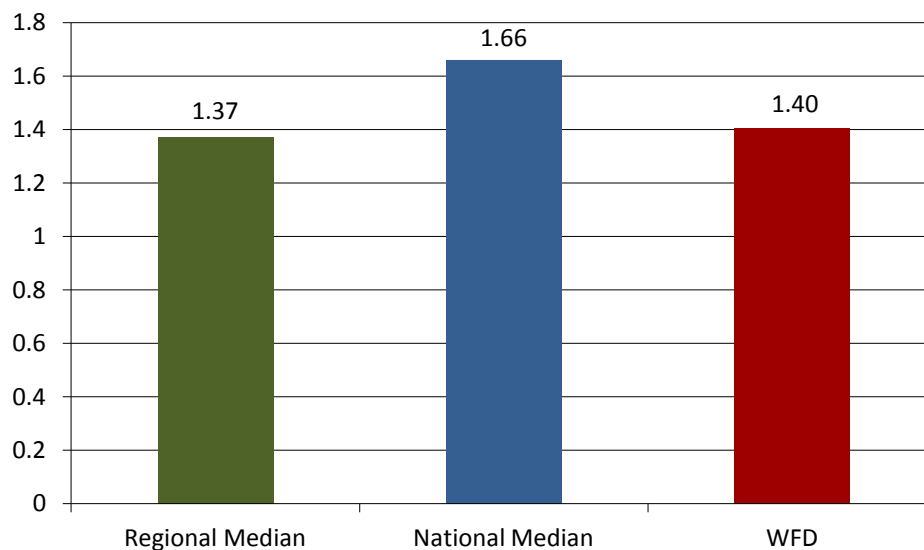
Operational Staffing

Aside from the administrative and support duties of those personnel noted above, individuals tasked with emergency response make up the core of any emergency services organization. These individuals must receive huge amounts of initial training, be dedicated to losing sleep to respond to incidents during overnight hours, potentially miss family and/or special occasions and holidays due to emergency response, and do all of this for little or no compensation in a volunteer organization. In addition to the

positions noted within the 'Administrative and Support Personnel' section above, WFD a number of 'Captains' and 'Lieutenants' that are responsible for apparatus as well as a large complement of volunteer firefighters for a total of 105 members within the organization across all divisions.

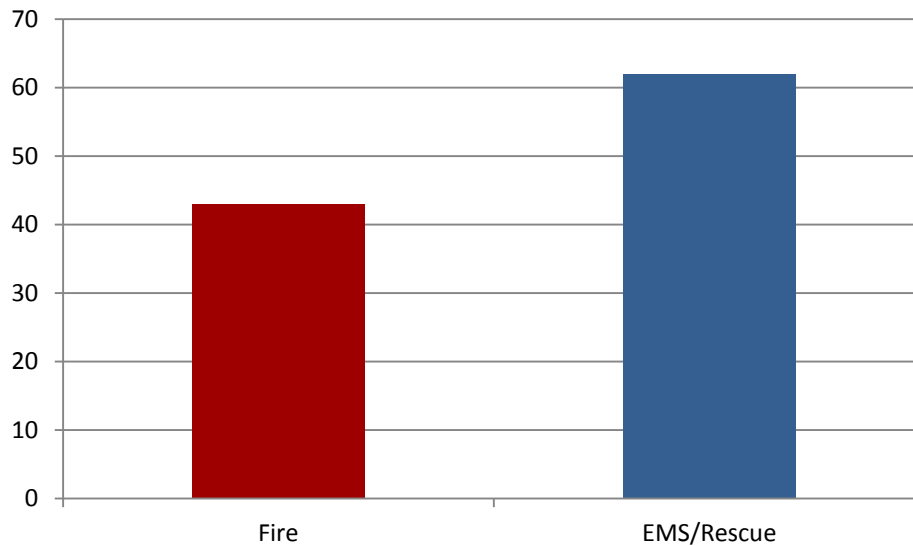
As illustrated in the figure below, WFD has a slightly higher number of volunteers than the regional median but slightly less than the national median.

Figure 18: Volunteer Staffing Benchmark



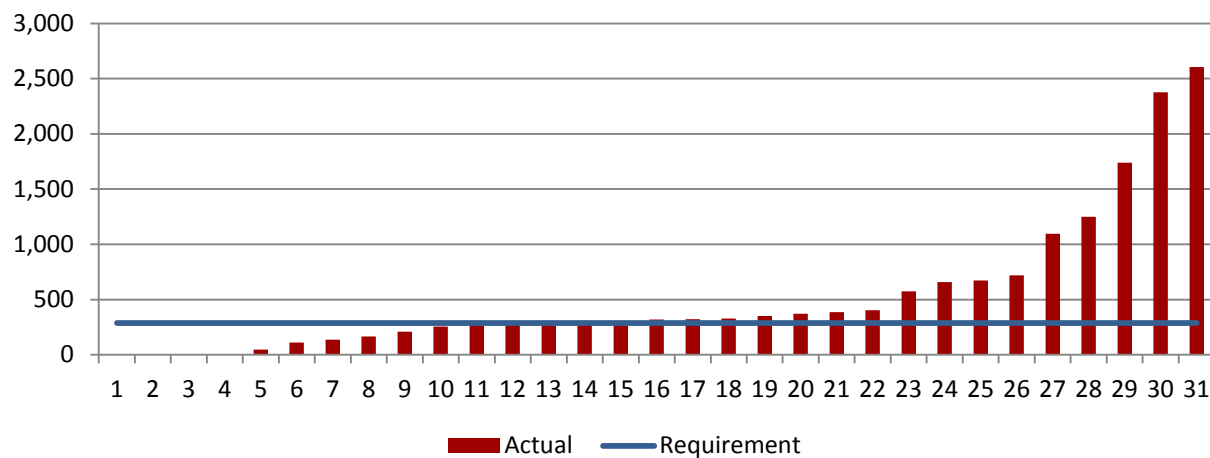
While the figure above only considers those personnel that are focused on fire suppression, it should be noted that this total count of personnel (105) includes all personnel across all department divisions. The figure below illustrates how that total personnel are distributed across the three departmental divisions.

Figure 19: Staff Distribution



Given the roster of personnel made available to ESCI, only 60 percent of the total roster of regular members has been fulfilling their obligations as laid out in the organization's bylaws. Several regular EMS/rescue staff failed to meet their duty obligations during calendar year 2012 as illustrated in the following figure where numbers have been randomly assigned rather than identifying specific personnel.

Figure 20: Actual Duty Hours versus Requirement for EMS/Rescue Personnel (Regular Members)



Although viewed the overall numbers of personnel within a department is useful in comparing the organization to others, the purpose of these personnel is to respond to incidents. While much of the department's service demand is related to rescue/EMS incidents, as will be discussed later, that require

fewer personnel, structure fires require a much higher number of responders to effectively mitigate the incident. Based on the department's National Fire Incident Reporting System (NFIRS) data for 2012, SVFD was able to generate an average of 19.2 firefighters per structure fire. This is compared to the Center for Public Safety Excellence's recommendation of 12 to 14 personnel for a single-family moderate risk structure fire.

Emergency medical services (EMS) incidents, unlike structure fires, require only a few resources. Based on data provided by WFD (Rescue Division), 92 percent of the incidents responded to from August 2011 through July 2013 received an emergency response with lights and siren. This is in comparison, however, to only 6.9 percent of those incidents that were actually transported with lights and siren. In other words, although much of the department's service demand is dispatched as an emergency, only a fraction of those incidents are actually life-threatening events.

WFD currently responds to a majority of 'Rescue' incidents with three personnel, with at least one at the Advanced Emergency Medical Technician (AEMT) level. While there are no published standards for the optimum number of ambulance personnel, recent studies indicate that there is no significant difference in effectiveness of CPR or in time to perform Basic Life Support (BLS) or Advanced Life Support (ALS) procedures among varying crew size configurations.⁴ That same study also found that, "The performance of optimal CPR may be hindered by distractions related to the performance of ALS procedures with increasing group size..." Another study found that, "Two-person EMS crews perform the same number of procedures as do three-person EMS crews...[however], two-person EMS crews may have statistically significantly longer on-scene times than three-person EMS crews."⁵

Regarding ambulance staffing, the State of Wisconsin only requires that an ambulance be staffed with two personnel, at least one of which must be at the level at which the provider is operating; AEMT for WFD. There are many reported reasons for staffing an ambulance with three personnel but in a time when staffing shortages are potentially delaying a response, it is time for the department to rethink its decision to staff three personnel per ambulance.

⁴ Christian Martin-Gill, MD, Francis X. Guyette, MD, MPH, Jon C. Rittenberger, MD, MS. "Effect of Crew Size on Objective Measures of Resuscitation for Out-of-Hospital Cardiac Arrest." *Prehospital Emergency Care*, April-June 2010, Vol. 14, No. 2 : Pages 229-234.

⁵ Brown LH, Owens CF Jr, March JA, Archino EA. "Does ambulance crew size affect on-scene time or number of prehospital interventions?" *Prehosp Disaster Med*. 1996 Jul-Sep;11(3):214-7; discussion 217-8.

Recommendations:

- Personnel that are not meeting their on-duty (signup) obligations should be placed on probation and/or terminated based on guidelines established within the department bylaws.
- The department should reconsider its policy of staffing ambulances with three personnel and ensure that personnel are properly training and experienced to handle and/or supervise a two-person crew.

Personnel Qualifications

NFPA publishes recommended standards for fire service personnel and these standards apply to career and volunteer/paid-on-call personnel unilaterally. *NFPA 1001 Standard for Fire Fighter Professional Qualifications* identifies the minimum job requirements for career and volunteer fire fighters whose duties are primarily structural in nature. Chapter 5 of the NFPA document states that the general knowledge requirements for certification as a Fire Fighter I should include, “The organization of the fire department; the role of the Fire Fighter I in the organization; the mission of fire service; the fire department’s standard operating procedures (SOPs) and rules and regulations as they apply to the Fire Fighter I; the role of other agencies as they relate to the fire department; aspects of the fire department’s member assistance program; the importance of physical fitness and a healthy lifestyle to the performance of the duties of a fire fighter; the critical aspects of NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, as they apply to the Fire Fighter I; knot types and usage; the difference between life safety and utility rope; reasons for placing rope out of service; the types of knots to use for given tools, ropes, or situations; hoisting methods for tools and equipment; and using rope to support response activities.”⁶

In addition, personnel should meet general skills requirements including, “The ability to don personal protective clothing within 1 minute; doff personal protective clothing and prepare for reuse; hoist tools and equipment using ropes and the correct knot; and locate information in departmental documents and standard or code materials...” and, “Use self-contained breathing apparatus (SCBA) during emergency operations, given SCBA and other personal protective equipment, so that the SCBA is correctly donned and activated within 1 minute, the SCBA is correctly worn, controlled breathing techniques are used, emergency procedures are enacted if the SCBA fails, all low-air warnings are

⁶ *NFPA 1001 Standard for Fire Fighter Professional Qualifications*. Chapter 5.

recognized, respiratory protection is not intentionally compromised, and hazardous areas are exited prior to air depletion.”⁷

Based on departmental bylaws, the only minimum requirement to be an active ‘Fire’ member is that an individual be, “...of good moral habits who has passed all legal requirements and physical examination, and who is 21 years of age...” For ‘Rescue’ membership, the bylaws state that individuals must hold a valid Emergency Medical Technician (EMT) credential and be at least 18 years old.

In addition to basic firefighting qualifications, *NFPA 1021 Standard for Fire Officer Professional Qualifications* identifies the minimum job performance requirements necessary to perform the duties of a fire officer and provide for a specific progression to the rank of Chief Officer. The levels are illustrated below.

- Fire Officer I - The fire officer, at the supervisory level, who has met the job performance requirements, specified in this standard for Level I. Must meet the requirements of Fire Fighter II as defined in *NFPA 1001*, Fire Instructor I as defined in *NFPA 1041*, and specific job performance requirements detailed in *NFPA 1021*.
- Fire Officer II - The fire officer, at the supervisory/managerial level, who has met the job performance requirements specified in this standard for Level II. Must meet the requirements of Fire Officer I plus additional job performance requirements detailed in *NFPA 1021*.
- Fire Officer III - The fire officer, at the managerial/administrative level, who has met the job performance requirements specified in this standard for Level III. Must meet the requirements of Fire Officer II, Fire Instructor II as defined in *NFPA 1041* plus additional job performance requirements detailed in *NFPA 1021*.
- Fire Officer IV - The fire officer, at the administrative level, who has met the job performance requirements specified in this standard for Level IV. Must meet the requirements of Fire Officer III plus additional job performance requirements detailed in *NFPA 1021*.

Currently, WFD has no minimum qualifications to hold an officer position within the department, regardless of division. Due to the process whereby Chief Officers are elected by the membership, appointment as an officer has become more of a popularity contest rather than appointment based on qualifications. The department, regardless of future service delivery model, should implement firm minimum qualifications for all officer positions.

In review of the compliance with Section 1910.120, the most significant finding was the lack of personnel trained to the “Operations” level specified by the OSHA rules. While all specialist and

⁷ *Ibid.*

technician hazardous materials response comes from external resources, WFD firefighters receive training only to the “Awareness” level.

Of primary concern here is that WFD should have firm procedures in place to limit any personnel from performing tasks and functions that would be considered above their level of training and certification at incidents involving hazardous materials release. Personnel not trained beyond the Awareness level should not be permitted to respond to hazardous materials incident dispatches, but rather should be directed to remain in an off-site support mode.

The Awareness level of training is intended to enable an individual to “...discover a hazardous substance release and... initiate an emergency response sequence by notifying the proper authorities”, but nothing else.⁸ Obviously, once an incident has been reported, such as a fuel leak from a vehicle called in to 9-1-1, the incident has already been recognized and moved beyond the Awareness level. The act of dispatching a fire engine presumes action on the part of the responding crew involving size-up, containment, decontamination or clean-up. Any of these tasks would exceed the training level certified under Awareness and are actions specifically described in the “First Responder Operations Level.”⁹ Written procedures should prohibit response by personnel certified by their department at less than Operations level to any incident with a known, suspected, or likely release of a hazardous substance, including fuels and gases.

Recommendations:

- The department should implement minimum qualifications that follow NFPA 1001 for all personnel that will be actively engaged in structural firefighting. All personnel, including ‘Rescue’ personnel should undergo a pre-hire medical examination to ensure they are physically able to perform their required duties.
- The department should implement minimum qualifications to hold officer positions, regardless of division.
- All WFD personnel in all divisions should be trained to the First Responder Operations Level for hazardous materials.

⁸ OSHA CFR 1910.120(q)(6)(i)

⁹ OSHA CFR 1910.120(q)(6)(ii)

Staffing Performance

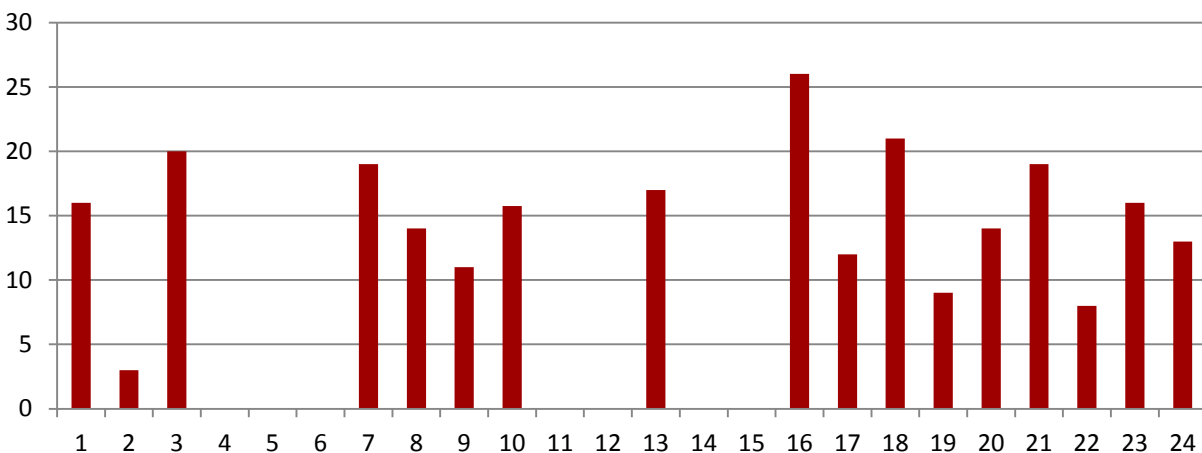
While raw numbers of personnel indicate a fire department's potential staffing for incidents, it is common for a limited number of those on the roster to respond to a majority of the incidents. ESCI evaluated the overall staffing performance of WFD by analyzing the department's National Fire Incident Reporting System (NFIRS) data that tracks the number of personnel on each incident. The following figure illustrates the average staffing performance over the period ranging from September 2011 to August 2013.

Figure 21: Average Structure Fire Staffing

Average Personnel	
2011	26.0
2012	13.8
2013	16.8

Given the volunteer nature of the department, it is also useful to evaluate staffing patterns based on hour of day. Most volunteer departments have a more difficult time generating their own personnel during normal business hours Monday through Friday. The figure below illustrates the average staffing by hour of day for the entire data period evaluated.

Figure 22: Average Structure Fire Staffing by Hour of Day



Based on the available data, the department's ability to generate its own personnel is variable and no simple pattern can be determined. The department should continue to monitor staffing in this manner and use a larger dataset to ensure that adequate staffing is available at all hours of the day.

ESCI also evaluated the department's EMS records management data that also indicates personnel assigned to an incident. The figure below illustrates the department's EMS performance over the past two years.

Figure 23: Average Rescue/EMS Staffing

Average Personnel	
2011	3.07
2012	3.32
2013	3.43

As already discussed, the department should reevaluate the need to staff each ambulance with three personnel in an effort to extend the organization's ability to respond to simultaneous incidents.

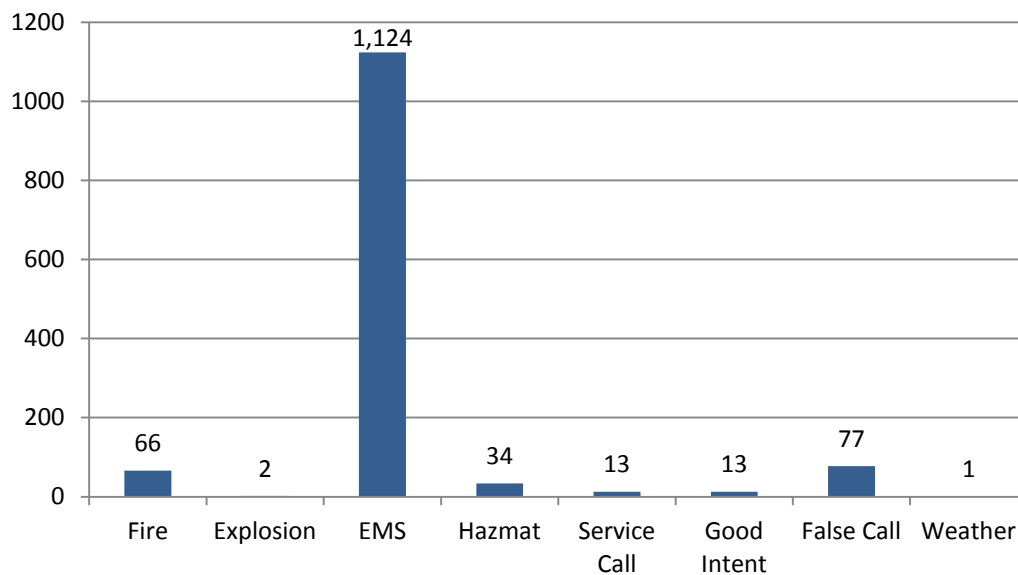
Service Delivery and Performance

While a fire department cannot function without sufficient staff, adequate facilities, and appropriate apparatus, the services that are delivered to the community are the ultimate measure of effectiveness. This section evaluates the actual service delivery components within WFD, including service demand (workload), distribution of resources in relation to service demand, concentration capability, response reliability, response performance, and the use of mutual and automatic aid systems.

Demand

Demand for any emergency services organization can vary based on several factors, including what services are offered, population density, economic factors, or demographics. The figure below illustrates the department's total workload over the provided data period based on computer aided dispatch (CAD) records.

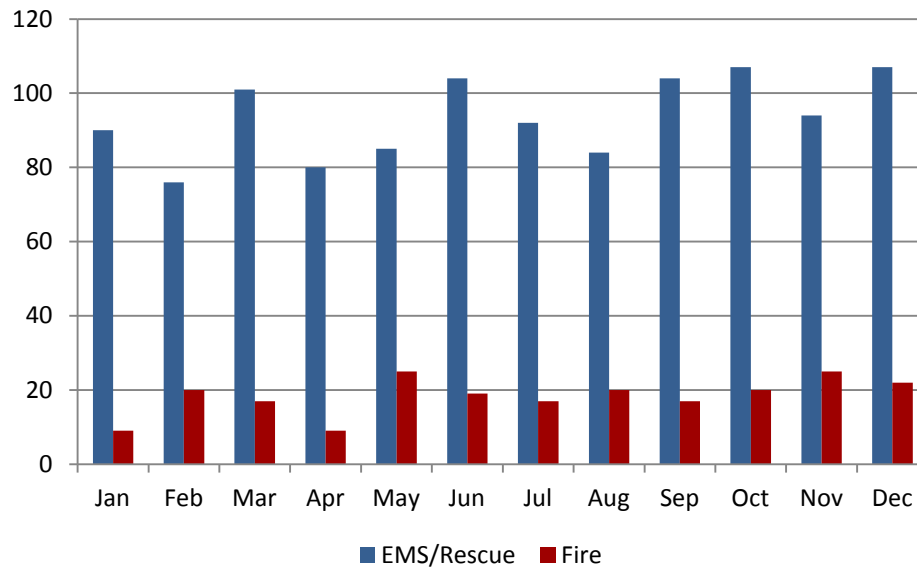
Figure 24: Total Department Service Demand - 2012



As expected, EMS comprises a majority of the department's workload while false calls and fires of all types are a distant second and third respectively.

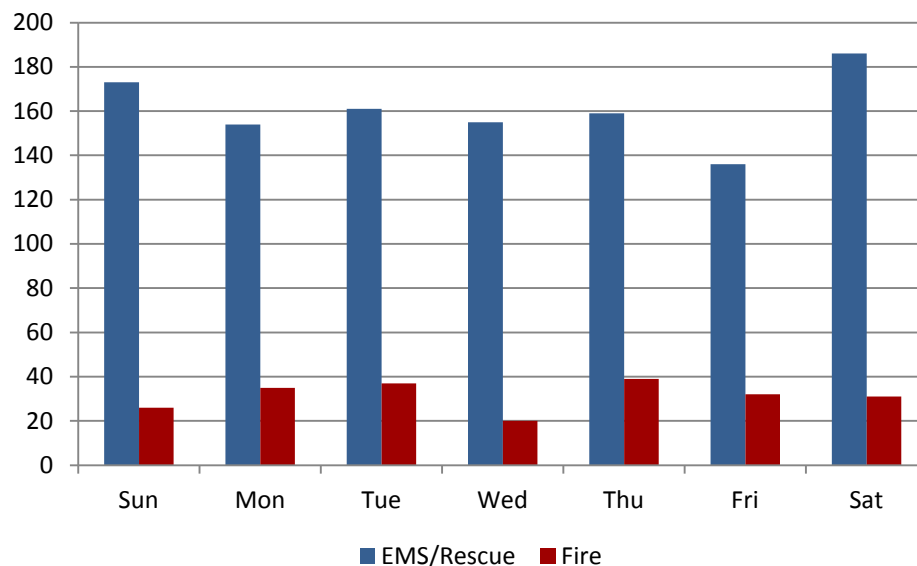
Aside from aggregate numbers, it is also useful to evaluate service demand temporally in order to determine if there are specific trends during certain periods where, perhaps, staffing can be modified to better fit the demand. The temporal analysis begins with a look at service demand by month.

Figure 25: Service Demand by Month - 2012



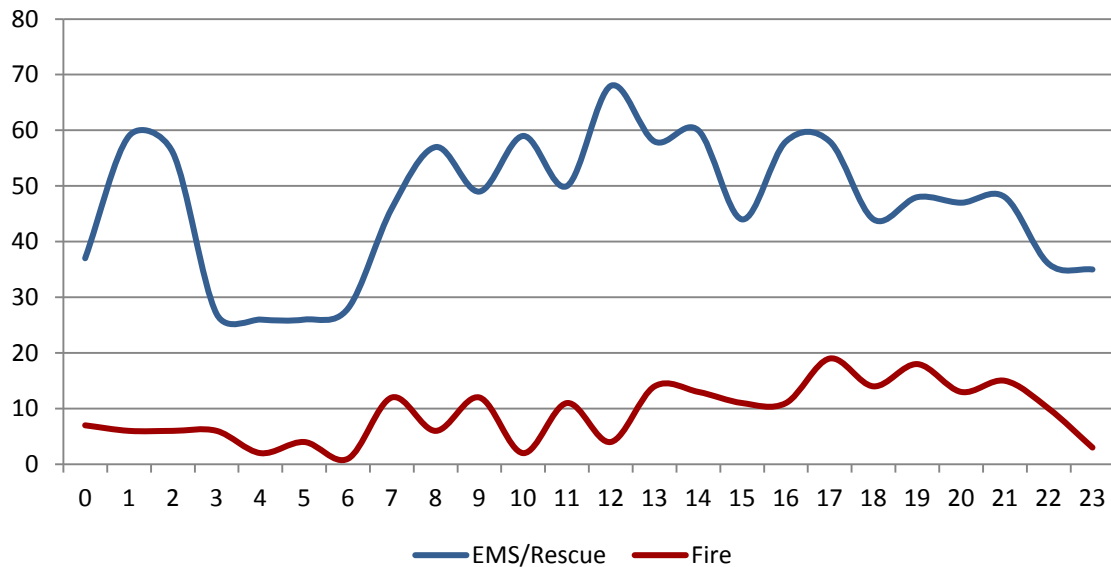
While service demand is variable for both fire and EMS/rescue throughout the year, there is little in the way of an identifiable pattern. The next analysis is of service demand by day of week.

Figure 26: Service Demand by Day of Week - 2012



The busiest day of the week for WFD is Saturday for EMS/rescue incidents and Thursday for fire incidents. The final temporal analysis evaluated service demand by hour of day.

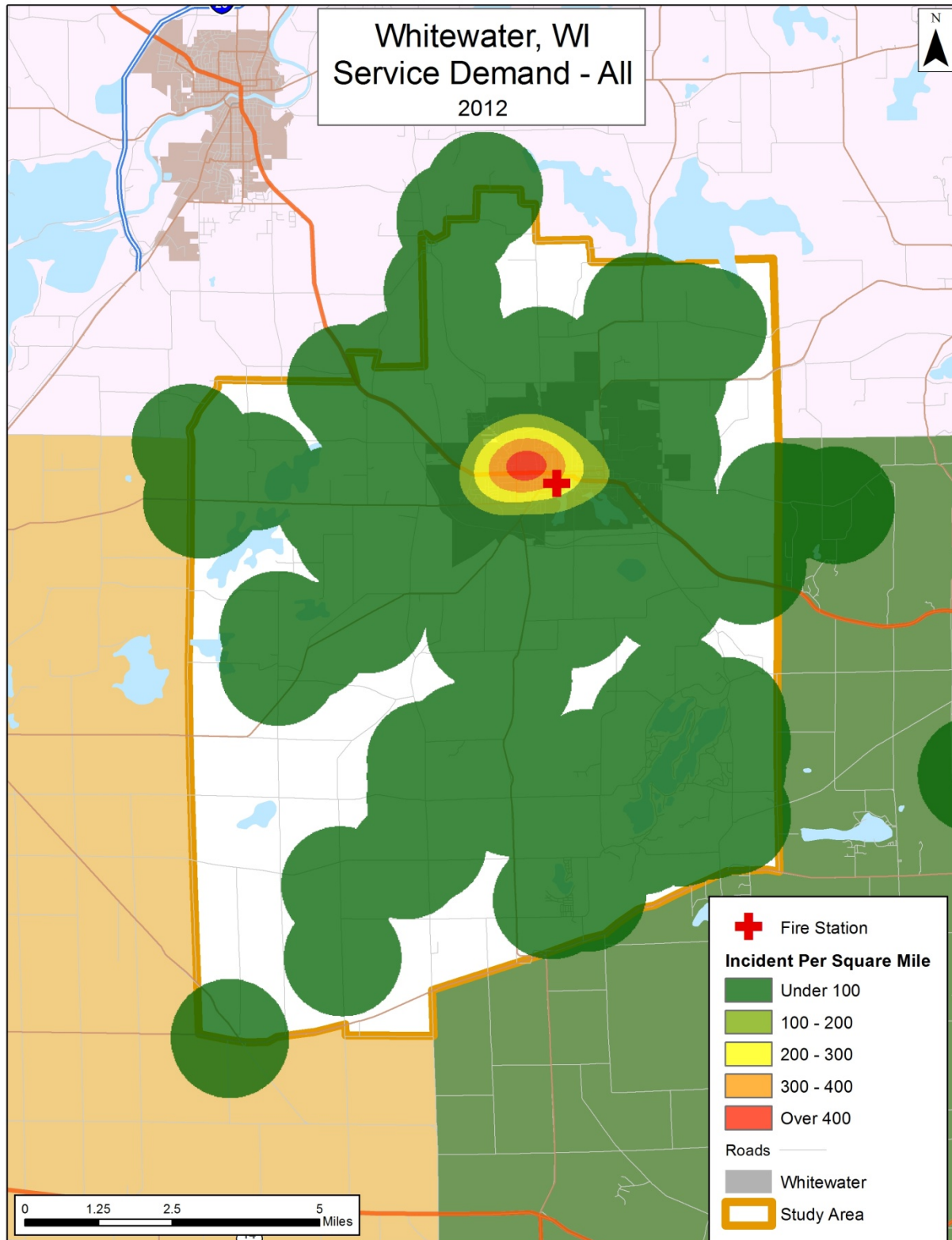
Figure 27: Service Demand by Hour of Day - 2012



Unlike the previous two temporal analyses, service demand by hour of day has a discernible pattern where service demand begins to increase between 6:00 a.m. and 7:00 a.m., peaks around mid-day and then tapers off into the evening. This is especially true of the EMS/rescue division where service demand should closely follow human activity throughout a normal day.

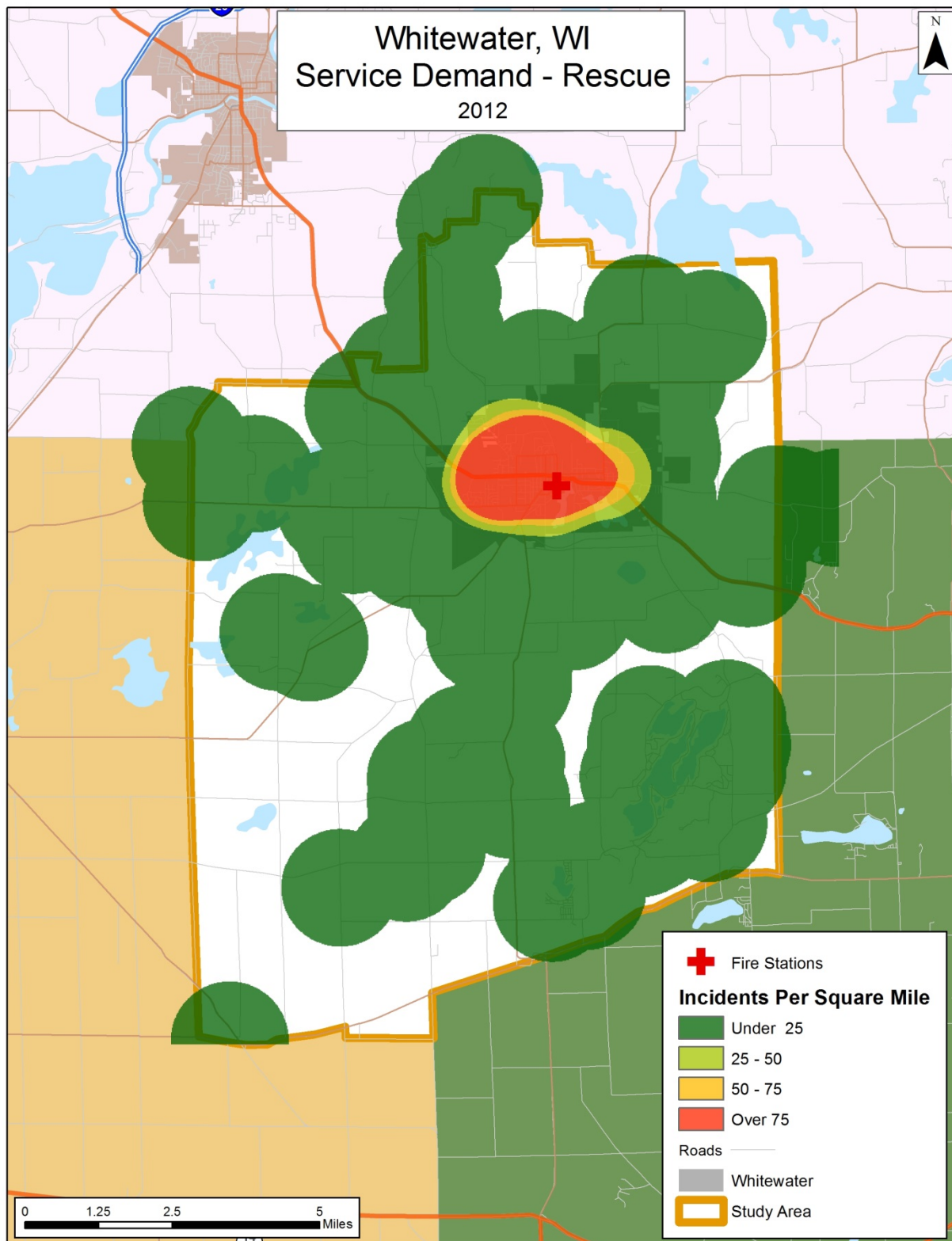
Although the previous paragraphs have evaluated service demand statistically, it is also important to know *where* service demand is occurring. The following figure illustrates a geographic plotting of all service demand for 2012.

Figure 28: Total Service Demand – 2012



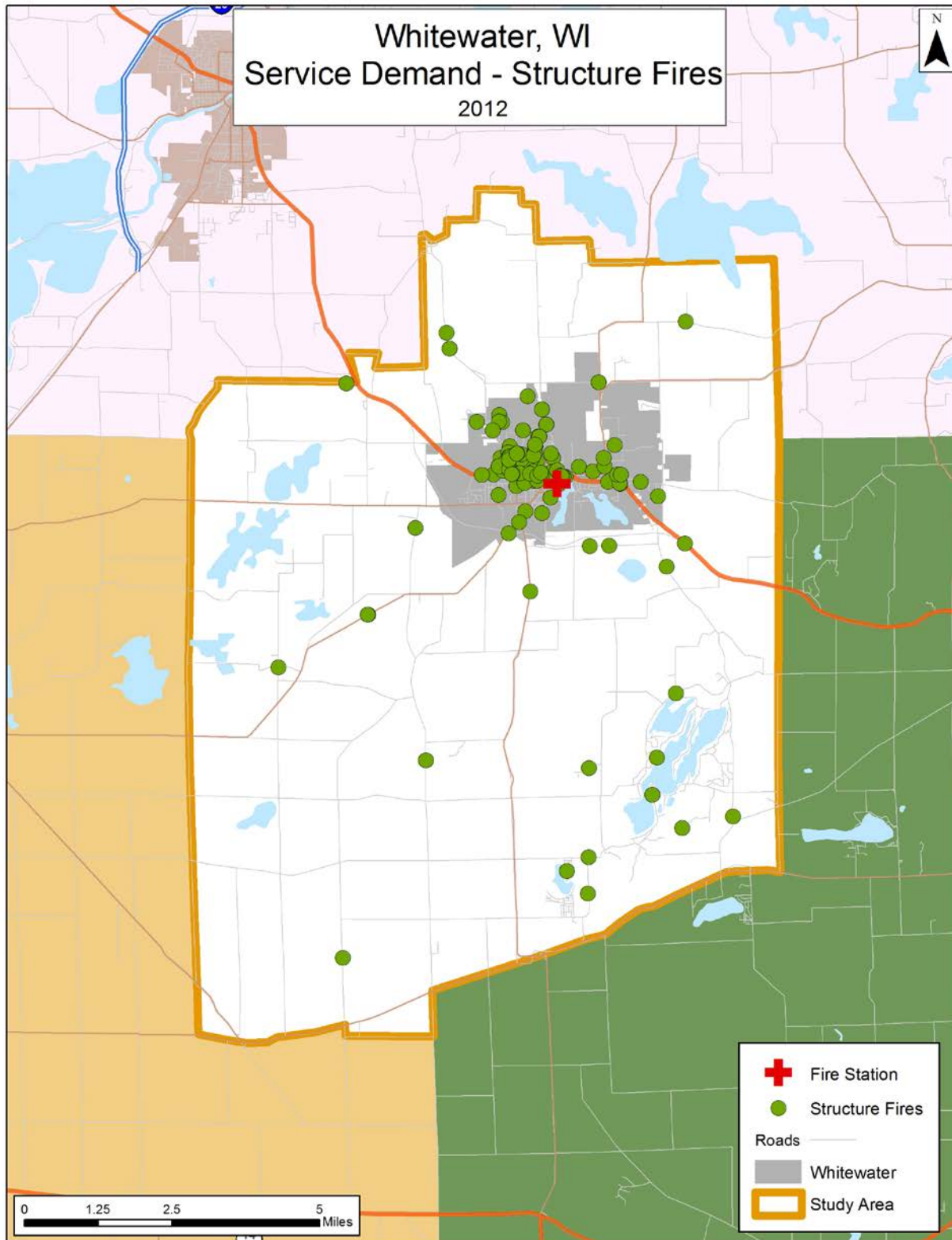
As illustrated in the figure above, while there is a scattering of incidents throughout the overall service area, the highest concentration is within the city of Whitewater, as expected. The following figure breaks out medical incidents specifically since those incidents comprise a majority of the organization's overall demand.

Figure 29: Medical Service Demand – 2012



Medical service demand is scattered throughout the service area with a higher concentration within the City of Whitewater. While medical service demand presents similarly to overall demand, it is also useful to identify where most actual fires occur, particularly structure fires. The figure below plots all structures fires during 2012.

Figure 30: Structure Fire Service Demand – 2012

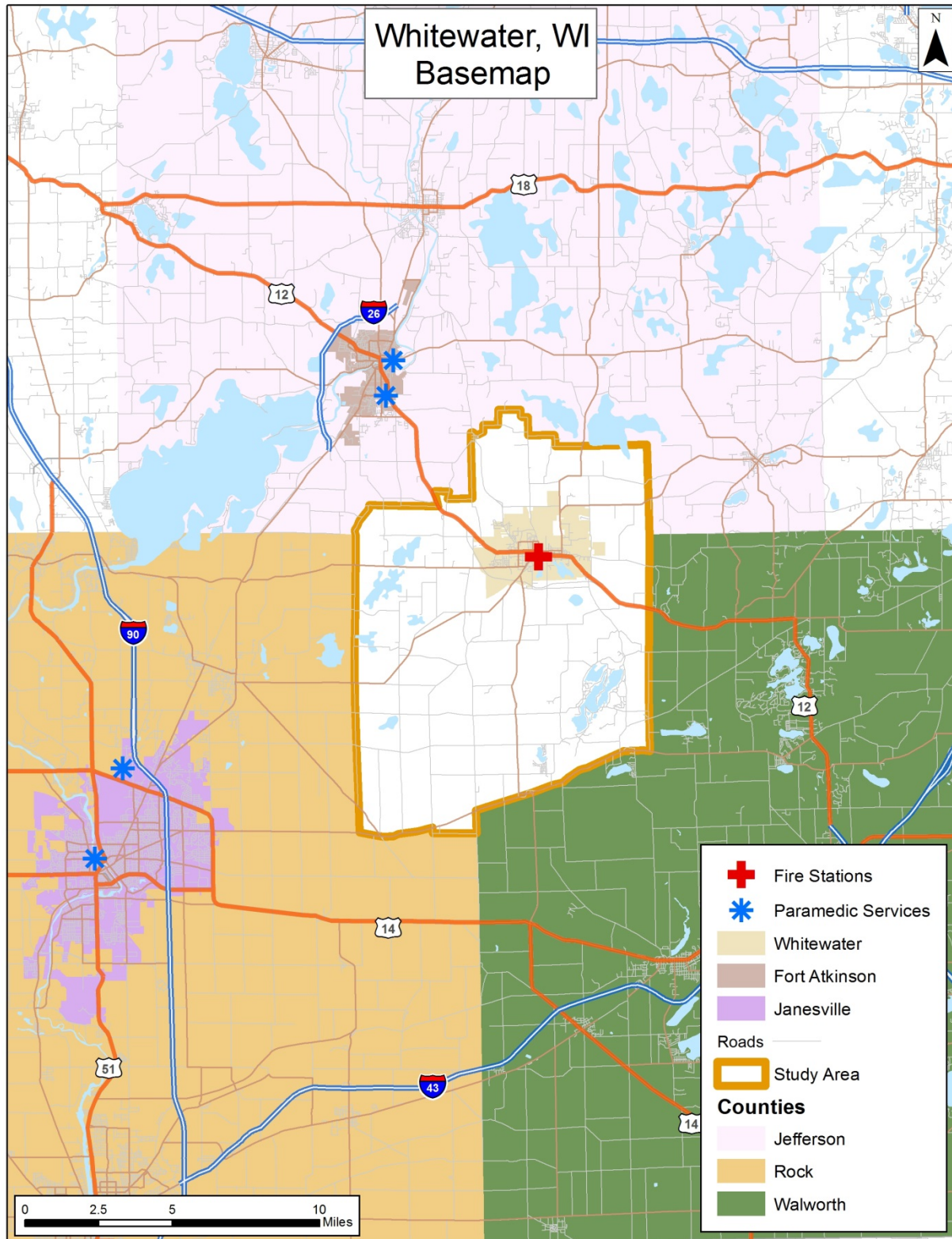


While most structure fires occur within the City of Whitewater where the most dense structures are located, there are still several that are spread across the overall response area, which should not expect to receive the same level of service as those in closer proximity to the fire station. The next analysis evaluates how well resources are distributed to meet the previously presented service demand.

Distribution

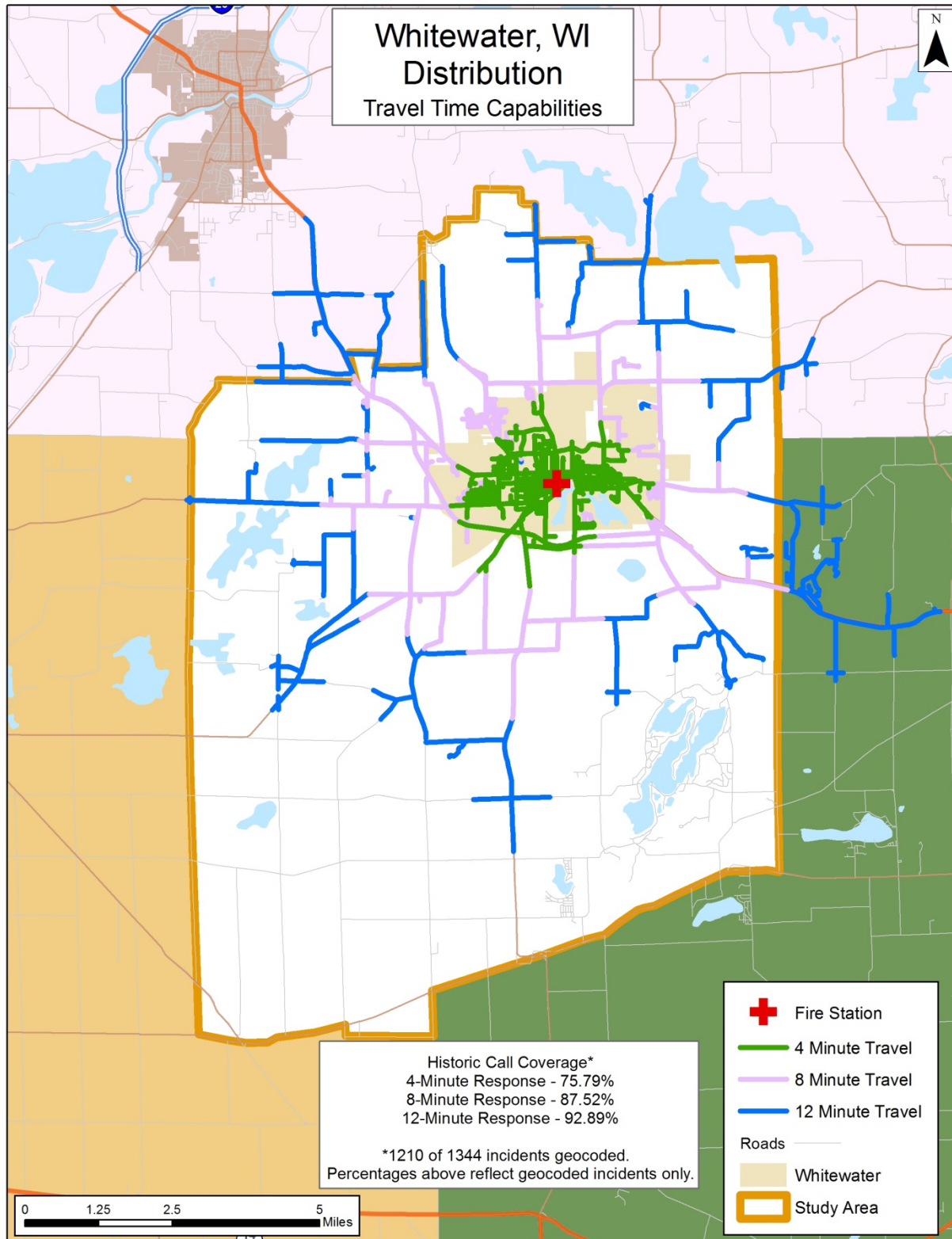
Distribution is the analysis of how well department resources (facilities) are spread across an area in order to affect an efficient response to emergency incidents. WFD operates from a single facility located within the City of Whitewater, as illustrated in the following figure.

Figure 31: Resource Distribution



To assist in the presentation of where additional units, particularly ALS response units, may respond from, ESCI included those on the previous figure. From the single station located within the City of Whitewater, WFD can respond to a certain area based on the existing roadway network and any special conditions such as weather or traffic congestion. Given the existing roadway network, ESCI constructed a travel time model that illustrates the department's ability to respond to incidents within four, eight and 12 minutes of travel. This is illustrated in the following figure.

Figure 32: Four, Eight, and 12-Minute Travel Capability

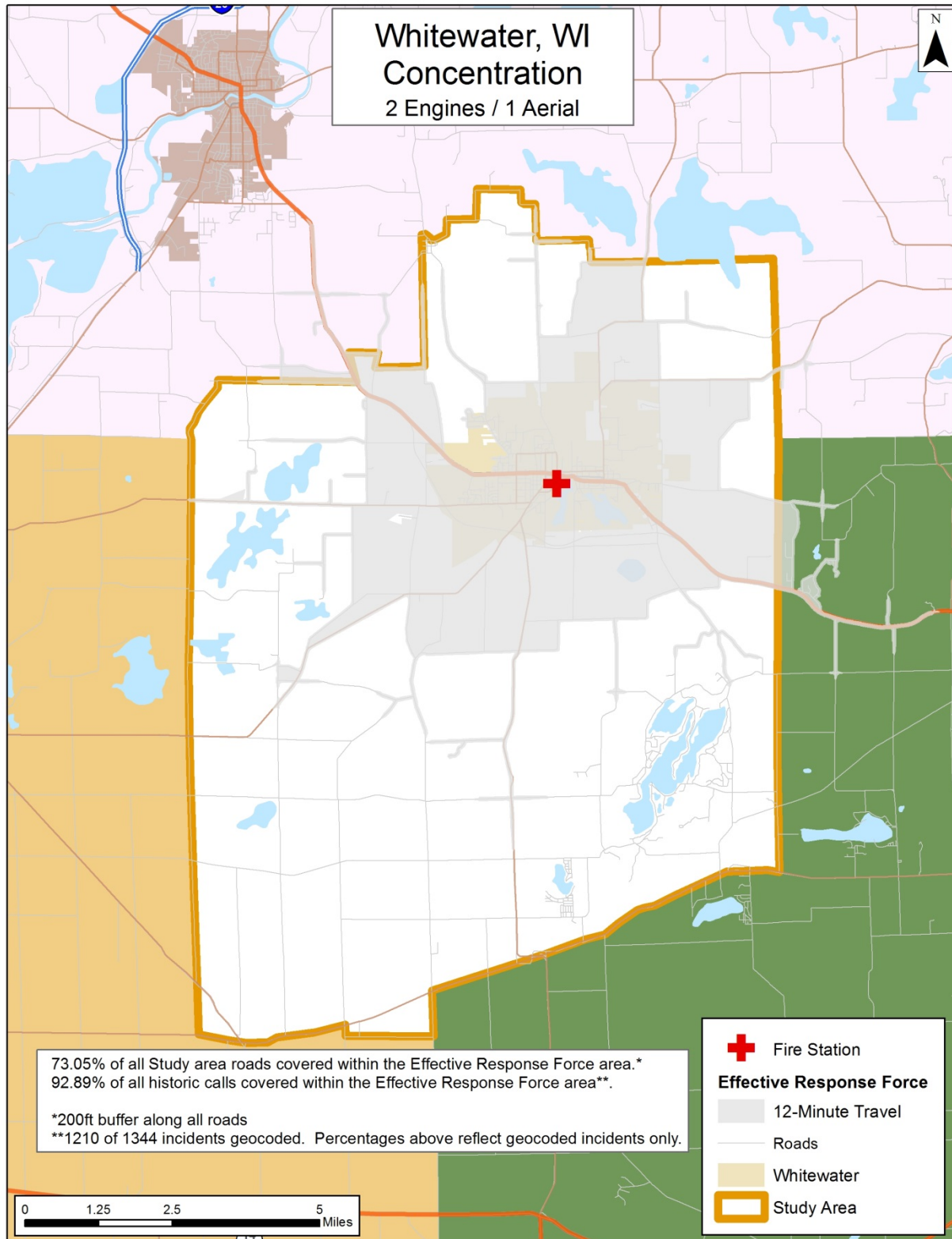


Based on the travel model above, 75.79 percent of historic service demand can be reached within four minutes of travel from the existing station location; 87.52 percent within eight minutes; and 92.89 percent within 12 minutes. If the department were to apply a set of tiered response performance objectives, ESCI feels as though additional stations would not be necessary to meet existing levels of demand.

Concentration

Concentration analysis evaluates an organization's ability to assemble a sufficient number of apparatus and/or personnel to effectively mitigate a certain level of risk. This is also known as an effective response force (ERF) and can be measured a number of ways. For the purposes of this study, ESCI ignored response boundaries, included mutual aid units where available, and assumed a normal apparatus staffing of three personnel on each engine and aerial apparatus. The following map illustrates how well the study region can assemble an effective response force of two engines and one aerial ladder within the given response time parameters.

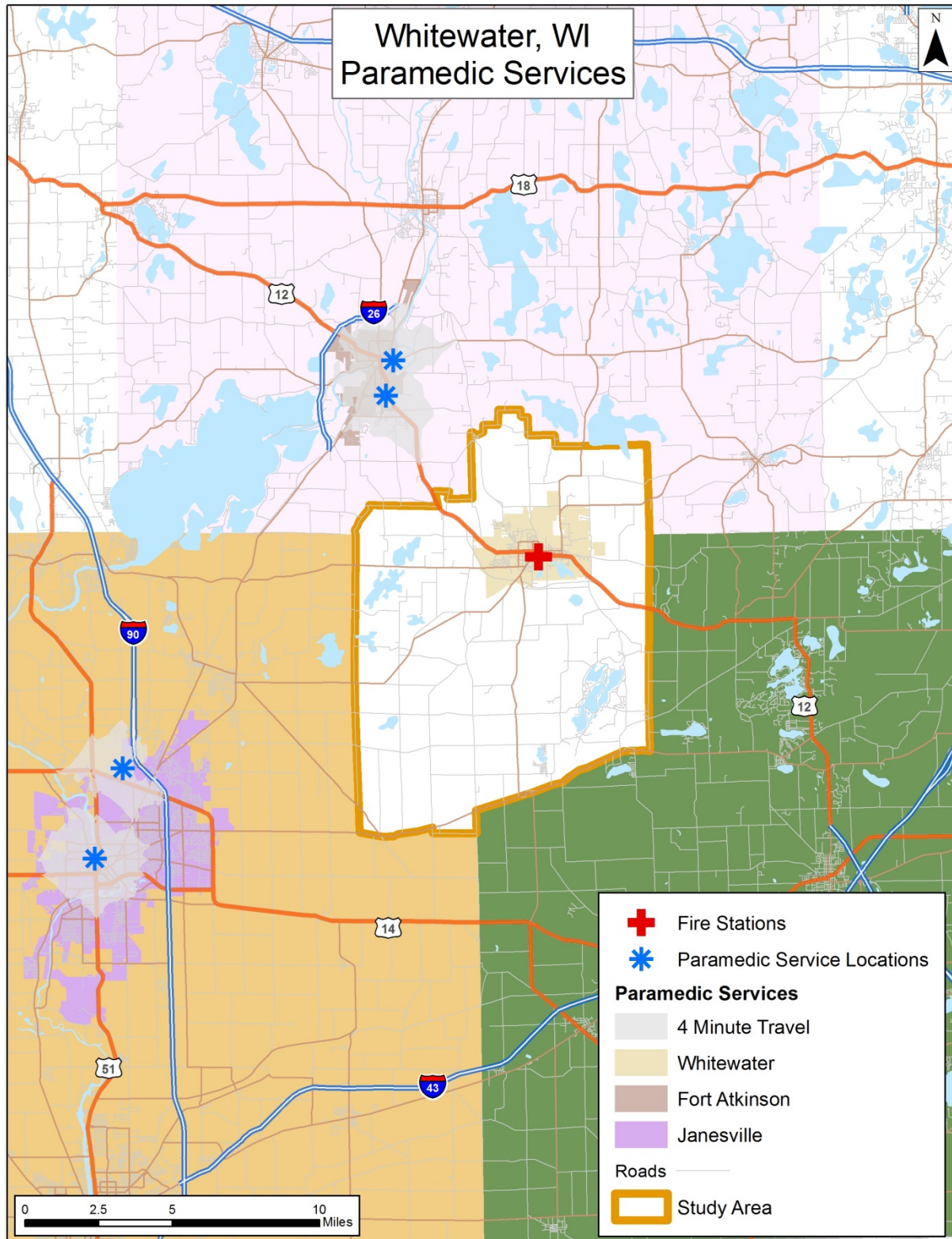
Figure 33: Effective Response Force Concentration



Given the fact that WFD responds from a single facility and the nearest mutual aid department is outside a 12-minute response, all resources to establish an effective response force would come from internal resources. An effective response force of two engines and one aerial can be assembled within 12 minutes of travel time to approximately 73.05 percent of the service area and 92.89 percent of the historic service demand distribution. This model does not take into account staffing patterns and only evaluates concentration capabilities based on current deployment of physical resources and travel time models. The model ignores the time necessary for volunteer personnel to assemble at the station.

While concentration analysis is intended to provide the fire service with an evaluation of the potential for the assembly of enough resources to effectively mitigate a moderate risk incident, WFD also provides a substation number of medical responses as already discussed. Given that WFD only provides BLS transport services, ESCI felt that it was prudent to illustrate the department's capability in responding ALS resources to incidents within the service area. The figure below represents a four-minute travel from the nearest ALS units around Whitewater.

Figure 34: Four-Minute ALS Response Capability



As can be seen in the figure above, no part of the WFD response area can be reached within four minutes from the nearest ALS units. Therefore, ESCI evaluated both an eight and 12-minute travel capability from those same locations as presented below.

Figure 35: Eight-Minute ALS Response Capability

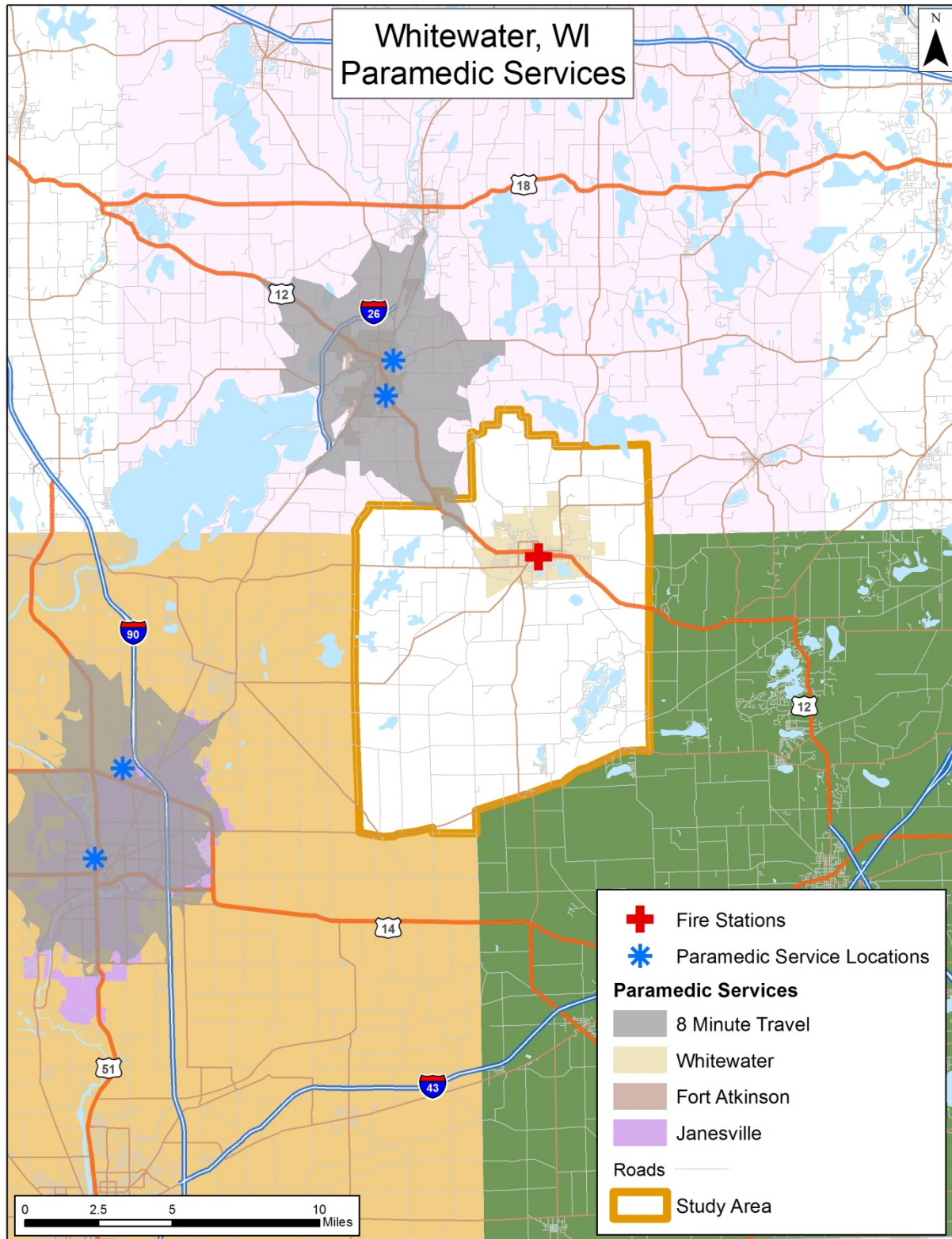
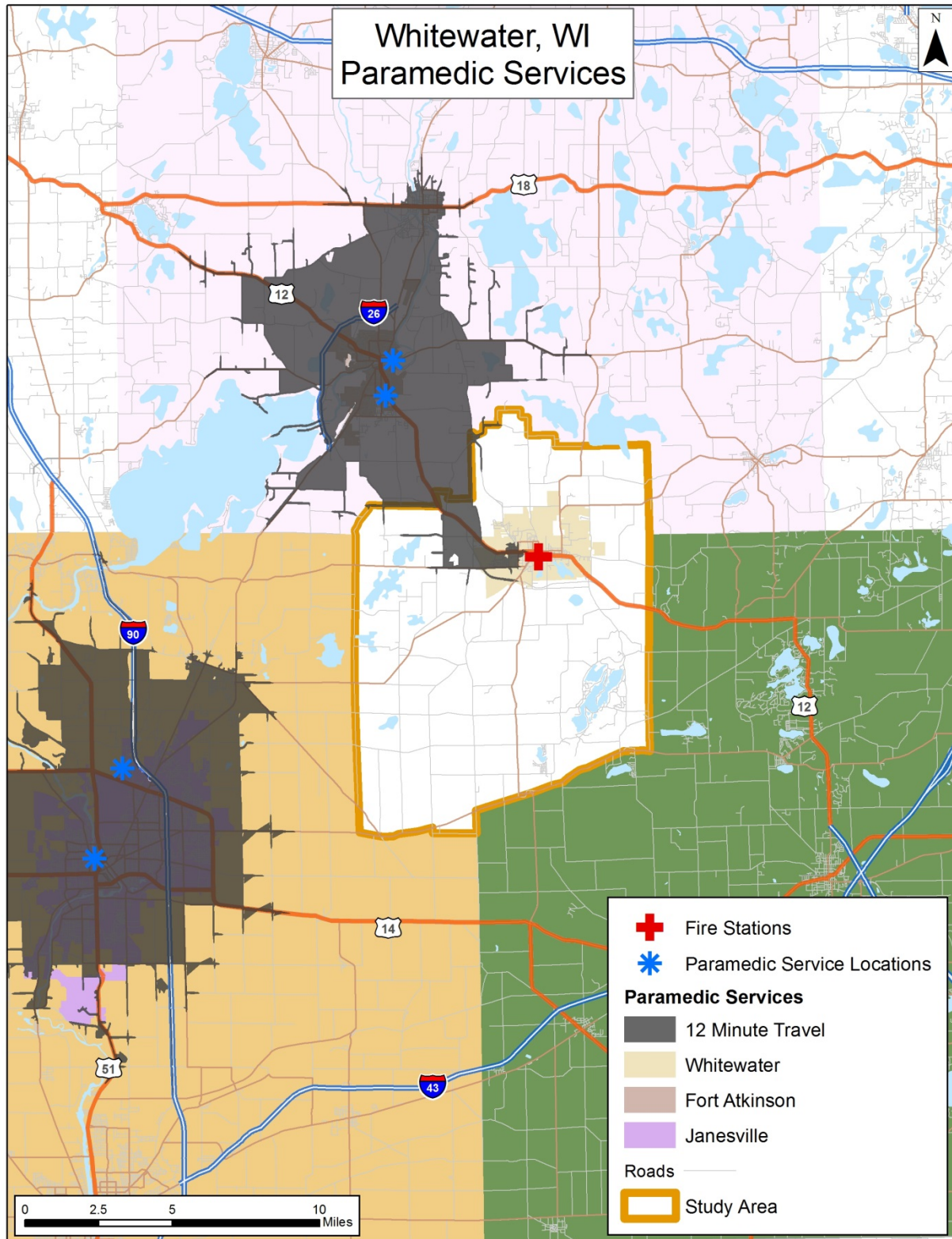


Figure 36: 12-Minute ALS Response Capability



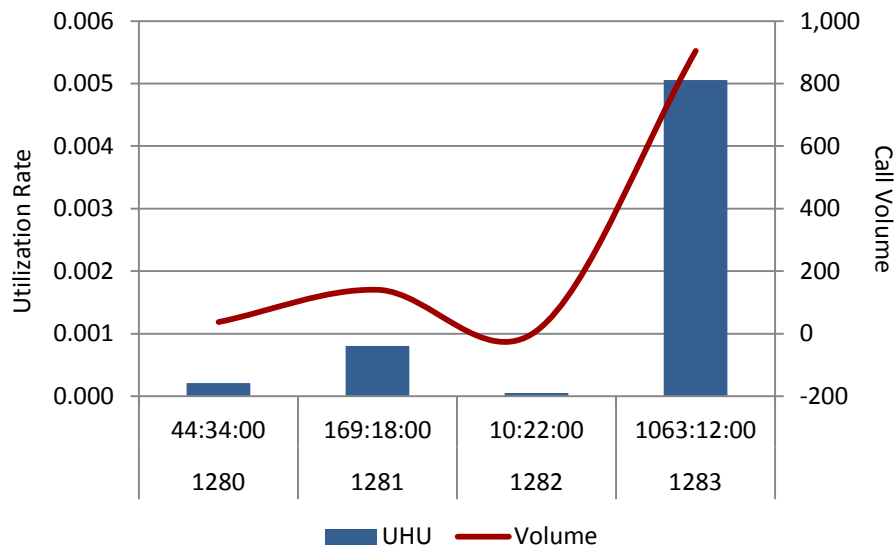
As can be seen in the two previous figures, only a small portion of the overall response area can be reached from the nearest ALS units within 12 minutes of travel. This is discussed further in a later section of this report.

Reliability

The workload on emergency response units can be a factor in response time performance. The busier a given unit, the less available it is for the next emergency. If a response unit is unavailable, then a unit from a more distant station must respond, increasing overall response time. A cushion of surplus response capacity above average values must be maintained due to less frequent but very critical times, when atypical demand patterns appear in the system. Multiple medical calls and multi-casualty events are examples.

A unit hour utilization (UHU) rate was calculated utilizing the actual time on any assignment for each unit. UHU is an important workload indicator because it describes the amount of time a unit is not available for response since it is already committed to another incident. The larger the number, the greater the unit's utilization and the less available it is for assignment to an incident. Studies of fire-based medical units indicate that significant employee burnout can occur with 0.30 UHU or above. However, third-service EMS providers suggest higher UHU ratios are acceptable; in the range of 0.35 - 0.40. Although rescue/EMS is provided within WFD, the separation apparent within the organization lends itself to more of a third-service model, thus the 0.40 threshold would apply. In private, for-profit ambulance_transport companies, a UHU above 0.50 would be acceptable. Typically, the workload would be divided appropriately among the different response units; however in this case, geographic extents and service demand variances create an unequal distribution of workload. The overall utilization is currently well below recommended targets, suggesting that workload is not an issue for improving response times as illustrated in the following figure.

Figure 37: Ambulance Unit Hour Utilization - 2012



Another way to look at resource workload is to examine the amount of time multiple calls occur within the same time frame on the same day. ESCI examined the calls during the last full year to find the frequency that WFD is handling multiple calls within any time frame. Multiple calls occurring at one time can stretch available resources and extend response times. As in most communities, the majority of calls in the WFD primary response area happen singularly. However, as communities grow the propensity for concurrent calls increases. When call concurrency reaches a level to which it stretches resources to near capacity, response times begin to extend. Although medical calls will cause drawdown as concurrency increases, they usually occupy only one unit at a time. Multi-casualty incidents (such as motor vehicle accidents) may need additional ambulances and create periods of extensive resource drawdown in an area. The following table detail the level of concurrency for WFD units, both fire and rescue/EMS.

Figure 38: Call Concurrency Rates

	Single	2	3	4	5
EMS/Rescue	84.6%	13.9%	1.4%	<1.0%	0.0%
Fire	82.3%	15.3%	2.3%	0.0%	0.0%

Based on this analysis, a vast majority of the department's workload for both EMS/Rescue and fire responses occur singularly. Frequently, however, a second simultaneous incident is dispatched. Generally speaking, concurrency rates are considered to be high when more than 10 percent of incidents are occurring simultaneously. In this case, the second call is occurring within this threshold but

three or more incidents are occurring at a rate that ESCI believes should rely on mutual aid assistance rather than maintaining a fleet for this amount of concurrent service demand.

Response Performance

Perhaps the most publicly visible component of an emergency services delivery system is that of response performance. Most citizens and policymakers alike want to know how quickly they can expect to receive services. Fire service leaders have historically reported this performance as an average response time but have failed to adequately explain the various elements of the overall response time continuum or report performance based on a percentile.

The 'average' measure is a commonly used descriptive statistic also called the mean of a data set. It is a measure which is a way to describe the central tendency, or the center of a data set. The average is the sum of all the points of data in a set divided by the total number of data points. In this measurement, each data point is counted and the value of each data point has an impact on the overall performance. Averages should be viewed with a certain amount of caution because the average measure can be skewed if an unusual data point, known as an outlier, is present within the data set. Depending on the sample size of the data set, this skewing can be either very large or very small.

As an example, assume that a particular fire station with a response time objective of six minutes or less had five calls on a particular day. If four of the calls had a response time of 8 minutes while the other call was across the street and only a few seconds away, the average would indicate the station was achieving its performance goal. However, four of the five calls, or 80 percent, were beyond the stated response time performance objective.

The opposite can also be true where one call with an unusually long response time can make otherwise satisfactory performance appear unacceptable. These calls with unusually short or long response time have a direct impact on the total performance measurements and the farther they are from the desired performance, the greater the impact.

The reason the average is computed is because of its common use and ease of understanding that is associated with it. The most important reason for not using averages for performance standards is that it does not accurately reflect the performance for the entire data set. As illustrated above, one extremely good or bad call skewed the entire average. While it does reflect all values, it does not really speak to the level of accomplishment in a strong manner.

With the average measure, it is recognized that some data points are below the average and some are above the average. The same is true for a median measure which simply arranges the data set in order and finds the value in which 50 percent of the data points are below the median and the other half are above the median value. This is also called the 50th percentile.

When working with percentiles, the actual value of the individual data does not have the same impact as it did in the average. The reason for this is that the percentile is nothing more than the ranking of the data set. The 90th percentile means that 10 percent of the data is greater than the value stated and all other data is at or below this level.

Higher percentile measurements are normally used for performance objectives and performance measurement because they show that the large majority of the data set has achieved a particular level of performance. This can then be compared to the desired performance objective to determine the degree of success in achieving the goal.

An emergency response actually begins when an individual calls for assistance, usually by dialing 9-1-1 or another published emergency number. Once the call is answered, a certain amount of time elapses until resources are dispatched. During this time, information is gathered so communications/dispatch personnel can alert the appropriate resources. The time period is known as call processing time. For WFD, all dispatching is handled through the Whitewater Police Department so it is technically out of the control of the fire department. Still, through a process of routine review, the fire department can influence policies to ensure that resources are being dispatched quickly and effectively. The figure below illustrates the historical call process performance as extracted from Computer Aided Dispatch (CAD) data covering the period January 1, 2012, through December 31, 2012.

Figure 39: Historical Call Processing Time

2012	
Average	00:18
95 th Percentile	02:00

NFPA 1221 recommends that communications center dispatch emergency incidents within 60 seconds when measured at the 95th percentile and all emergency incidents within 90 seconds from receipt. The current call processing performance exceeds the recommendations. It should be noted, however, that

data provided from the CAD does not include 'seconds,' which could negatively impact the ability to accurately measure call processing performance.

The next phase of the response time continuum is turnout. Turnout is the elapsed time between when an incident is dispatched and when resources are en route. This can vary in reliability within volunteer or on-call departments due to the way in which personnel respond. Simply getting an apparatus en route to a scene with one individual on board does nothing to effectively mitigate an incident. It is necessary for sufficient personnel to meet that responding apparatus and form an attack crew or effective response force commensurate with the incident.

Lengthy turnout time within a career department or a department that utilizes some sort of station staffing methodology may indicate any number of problems from staff complacency to inefficient station design. Department leadership should frequently monitor turnout time performance to ensure that identifiable issues can be corrected. The figure below illustrates the department's turnout time performance for the first responding apparatus.

Figure 40: Historical Turnout Time Performance - 2012

	Fire	EMS/Rescue
Average	05:20	05:18
90 th Percentile	09:00	09:00

While *NFPA 1720*, the standard that applies to volunteer and combination fire departments, does not include a turnout time performance objective, *NFPA 1710*, the standard that applies to career fire departments recommends a turnout time performance of 60 seconds for medical incidents and 80 seconds for fire incidents, both measured at the 90th percentile. Based on ESCI's experience, the current turnout time performance by WFD for emergency incidents is still above where it should be for a volunteer/on-call department.

The remaining element of the response time continuum is that of total response time, which typically includes turnout time, particularly for volunteer/on-call departments. Response time is usually measured from dispatch to the arrival of the first appropriate unit. This means that 'dummy' units and chief officers vehicles have been removed from the dataset and operational apparatus are the focus. The following figure illustrates the department's first arriving apparatus performance for the data provided.

Figure 41: Historical Total Response Performance - 2012

	Fire	EMS/Rescue
Average	10:49	09:00
80 th Percentile	14:00	12:00
90 th Percentile	19:00	15:00

For volunteer and combination fire departments, *NFPA 1720* contains tiered response performance recommendations as defined below.

Figure 42: NFPA 1720 Performance Recommendations

	Population Density	Response Time Performance Objective	Percentile
Urban	>1,000	9:00	90%
Suburban	500 – 999	10:00	80%
Rural	<500	14:00	80%
Remote	Wilderness	N/A	90%

Based on the dataset, there is nothing that allows the analysis of the various population densities within the WFD response area. While the City of Whitewater has a population density that places it in the ‘urban’ sector, the remainder of the service area falls within the ‘suburban’ and/or ‘rural’ sectors. A vast majority of incidents (77 percent) occur within the City and would presumably receive a quicker response time than those incidents occurring in the rural areas.

Mutual and Automatic Aid Programs

Communities have traditionally forged limited agreements to share resources under circumstances of extreme emergencies or disasters. These agreements, known as mutual aid agreements, allow one community to request the resources of another in order to mitigate an emergency situation or disaster that threatens lives or property. There are numerous mutual aid agreements, both formal and informal, in place between fire, police, and emergency medical agencies within the study area, both with participating departments and those surrounding the study area.

However, it is important to define the level of mutual aid systems in place in this region. Mutual aid can take several forms, and this analysis of mutual aid programs will begin with a brief explanation of the various types of mutual aid systems used by the fire service in various parts of North America.

Basic Mutual Aid upon Request

This form of mutual aid is the most basic and is typically permitted under broad public laws that allow communities to share resources upon request during times of disaster or during local and regional emergencies. Often, these broad laws permit communities to make decisions quickly regarding mutual aid under specified limitations of liability. These broad laws can allow a community to tap into resources from their immediate neighbors, as well as very distant resources in communities with which they have very little day-to-day contact otherwise. Under this level of mutual aid, specific resources are typically requested by the fire department, through the appropriate chain of command, and sometimes coordinated by local or regional emergency management personnel. Depending on the level of the request, the response can sometimes be slow and the authorization process may be cumbersome due to the exchange of official information or even elected official's approval that may be required.

Written Mutual Aid Agreements

This form of mutual aid takes the previous form one step further by formalizing written agreements between communities (typically immediate neighbors in a region) in an effort to simplify the procedures and, thus, cut response time. Usually, these written agreements include a process that takes the request and response authorization down to a lower level in the organization, such as the Fire Chief or other incident commander. By signing such agreements, communities are "pre-authorizing" the deployment of their resources under specified circumstances as spelled out in the agreement. Most often, these agreements are generally reciprocal in nature and rarely involve an exchange of money for service, though they may include methods for reimbursement of unusual expenses for long deployments.

Automatic Aid Agreements

Once again, this form of mutual aid takes the process an additional step further by spelling out certain circumstances under which one or more community's specific resources will respond automatically upon notification of a reported incident in the neighboring community. In essence, automatic aid agreements expand a community's initial first alarm response to certain types of incidents by adding resources from a nearby neighbor to that response protocol. Typically, such agreements are for specific geographic areas where the neighbor's resource can be expected to have a reasonable response time and are for only specific types of incidents. An example of such an agreement would be having a neighboring community's engine respond to all reported structure fires in an area where it would be closer than the second or third-due engine from the home community. In other cases, the agreement might cover a

type of resource, such as a water tender or aerial ladder, than the home community does not possess. An example of this would be having a neighboring community's water tender respond to all reported structure fires in the areas of the home community that do not have pressurized hydrants.

Automatic aid agreements may be purely reciprocal or they may involve the exchange of money for the services provided. Purely reciprocal agreements are common, but typically are used where each community has some resource or service it can provide to the benefit of the other. These services or resources need not be identical. For instance, one community may send an engine to the other community on automatic response to structure fires, while the second community agrees to send a water tender to the first community's structure fire calls in exchange. These reciprocal agreements are sometimes made without detailed concern over quantification of the equality of the services exchanged, since they promote the effectiveness of overall services in both communities. In other cases, the written agreements spell out costs that one community can charge the other for services, typically where no reasonable reciprocation can be anticipated.

One primary purpose of automatic aid agreements is to improve the regional application of resources and staffing. Since fire protection resources are most frequently established because of the occupancy risks in a community and not necessarily a heavy workload, these resources may be idle during frequent periods of time. While fire departments make productive use of this time through training, drills, pre-incident planning, and other functions, the fact is that these expensive resources of apparatus and staff are not heavily tied up on emergency incidents. Communities that share certain resources back and forth are, in essence, expanding the emergency response workload of those units across a larger geographic area that generally ignores jurisdictional lines. This expanded use of resources can strongly benefit both communities that might otherwise have significantly increased costs if they had to procure and establish all the same resources alone. Automatic aid can be used effectively to bolster a community's fire protection resources or to reduce unnecessary redundancy and overlap between communities.

WFD operates under a number of mutual and automatic aid agreements for both fire and EMS/Rescue. The townships of Cold Spring, Johnstown, Koshkonong, Lima, Richmond and Whitewater have entered into contracts for the City to provide ambulance services to those rural areas. Similarly, those same townships have contracted with the fire department to provide fire protection services. While it is

uncertain as to why two separate contracts exist, it is the recommendation of ESCI that a single contract be executed for the provision of both fire and EMS/Rescue services to the rural townships.

Aside from the contracts mentioned above, WFD has implemented a Mutual Aid Box Alarm System (MABAS) that allows dispatch personnel to summon additional resources based on specific incident types and involvement. This type of automatic aid is common, particularly across the upper Midwest in Ohio and Illinois, and is an excellent way of securing resources ahead of emergency incidents. The current 'box system' is comprised of 17 individual incident types from structure fires to brush fires, to technical rescue and hazardous materials response. The system includes resources such as engines, trucks/aerials, squads, ambulances, officers and other special equipment. The department has done an excellent job in working with its neighbors to establish this mutual aid system and should continue to enhance the program through a periodic review of both internal and external physical and personnel resources. For the data period evaluated, WFD did not respond outside the primary response area as a mutual aid company but received mutual aid 13 times during 2012 and eight times through July 2013.

Recommendations:

- The existing contracts for the provision of fire and ambulance services should be combined into a single contract for the provision of all emergency services with the rural townships.
- The department should continue the use of the box alarm system already in place and periodically review both internal and external physical and personnel resources to ensure that each card is up-to-date.

Emergency Medical Services Support and System Oversight

Emergency medical services (EMS) within the City of Whitewater, and the surrounding townships, are provided by WFD at the Basic Life Support Level (BLS) with the ability to request Advanced Life Support (ALS) resources from several surrounding agencies. The department is currently working on upgrading the level of service provided to the Advanced Emergency Medical Technician (AEMT) level, which will allow personnel to provide a higher level of care. Although a part of the fire department, the Rescue Squad (Rescue/EMS) division within the department is the actual medical provider. Those personnel designated as 'fire' personnel only do not routinely respond to medical emergencies.

While the Fire Chief is the ultimately responsible person for the system, an EMS Captain is appointed to manage the daily operations of the EMS organization. This position is assisted by four EMS Lieutenants that are specialized into various responsibilities. The EMS system currently in place within WFD is based solely on the availability of on-call personnel. No personnel are paid to remain at the station and be available for responses. The standard response complement is three personnel, although no national standard exists to dictate this level of staffing. While interviews with staff and the medical directors indicate that a staff of three is preferred, two personnel may also be utilized to respond to an incident as long as appropriately certified personnel are on board the unit.

All incidents are dispatched by Whitewater PD and no method of priority dispatch is in place, as will be discussed later. However, based on interviews with the medical directors, ALS units from Fort Hospital or other agencies are not routinely dispatched automatically, but there is a recommendation in place to automatically dispatch these resources on all chest pain incidents or other serious conditions where there is an increased likelihood of needing ALS care.

Logistical Support Services

As stated above, although EMS is delivered as a part of the overall structure within WFD, there is still a separation of the EMS activity within the organization. Thus, all logistical support services exist as a separate function under the Rescue/EMS structure. As is common with most modern transport EMS systems, disposable equipment utilized during the course of patient care such as dressings, bandages oxygen delivery devices, etc. are replaced on a one-for-one basis at the receiving facility.

The community has an active Public Access Defibrillation (PAD) program that has placed a number of Automated External Defibrillators (AED) throughout the community. Although a registry is in place to

track the placement, ownership and maintenance of these critical devices, there is no one assigned to be responsible for this program.

Recommendation:

- The department should assign one or more individuals to be responsible for the Public Access Defibrillation (PAD) program and to ensure that all equipment is appropriately placed, tracked, equipped and maintained.

Medical Control and Oversight

Medical control for WFD is provided through an un-paid contract with two physician medical directors; Dr. Ron Meyer and Dr. Jason Welch. Dr. Welch is the state recognized local medical director that is directly responsible for the quality of care provided by the department. Based on interviews with the medical director's Dr. Welch frequently interacts with department personnel and is actively involved in training and quality control programs. Dr. Meyer is located at Fort Hospital and is the regional medical director responsible for writing protocols for the services across the region.

Given the BLS level of the WFD resources, most medical procedures are conducted under standing order through the written protocols. That is, it is not necessary for field units to contact medical control prior to initiating many procedures. As the department advances, however, more complex skills and procedures may require that more frequent contact with medical control take place. Once that is the case, all field units have the ability to call medical control either via radio or via cellular phone to a dedicated medical control phone located in the Fort Hospital Emergency Department. In addition, a recently placed radio in the ED allows hospital staff to be aware of incidents that are dispatched and could potentially be transported to their facility.

Quality Assurance/Quality Improvement Programs

Performance measurement is a process by which organizations measure specific criteria and use that measurement as a gauge of needed improvement and or to produce a report card of performance. Quality assurance can be viewed as a use of performance measurement to ensure that established levels of quality are being met by individuals and by the organization as a whole. Quality improvement is the process of evaluating performance measurement and quality assurance efforts and cyclically developing programs and/or refining processes to correct any identified deficiencies.

While the department does not have a formal quality assurance/quality improvement program, the medical directors conduct QA/QI on all 'high acuity' (serious) incidents as well as a random review of approximately 80 percent of all patient care reports (PCR) for transported patients. Based on interviews with the medical directors, feedback from the QA/QI process is only provided on a limited basis and no statistical analysis is completed to ensure that future training is matched to deficiencies identified through the quality process.

Recommendations:

- The department should work with local medical direction to develop and implement a formal quality assurance/quality improvement program that provides feedback to field responders and allows for the direction of future training needs.

System Integrity and Credentialing

Emergency Medical Services within the State of Wisconsin are governed by Chapter 256 of the General Statutes. Specifically, Chapter 256.15 defines EMS personnel licensure, certification and training. The basic requirements for licensure as an Emergency Medical Technician – Basic (EMT-B) in the State of Wisconsin include:

- Be at least 18 years of age,
- Be capable of performing the actions authorized in rules promulgated by the department,
- Satisfactorily complete an EMT-B course as defined by the department,
- Pass an examination approved by the department.

In order to re-certify at the EMT-B level, all personnel must meet the requirements above as well as the requirement outlined in Chapter DHS 110, Subchapter II including:

- Complete a 30-hour EMT-basic refresher course based on the Wisconsin EMT-basic curriculum or other training, approved by the department, during the biennium for which the current license expires;
- Certified in cardiopulmonary resuscitation,
- Does not have an arrest or conviction record that is substantially related to performing the duties of an EMS professional, as determined by the department.

Based on interviews with department personnel, the practice of staffing ambulances with three personnel may be linked to personnel skill levels or confidence in their skills. While this assertion is

purely anecdotal, the department should ensure that all personnel are adequately training and able to perform the necessary skills they are expected to perform. With increased training and building of confidence among personnel, there is the potential to reduce the common ambulance staffing to two, thereby creating additional personnel availability for subsequent responses.

Recommendations:

- The department should ensure that all Rescue/EMS personnel are adequately trained and able to perform the necessary skills they are expected to perform.

Technical Rescue Services Support and Response Capability

Technical rescue is a specialty discipline within emergency services that focuses on the delivery of highly specialized situational knowledge, skills and abilities. These specialty areas include vehicle/machinery extrication, rope rescue (high and low angle), tower/antenna rescue, confined space rescue, trench and structural collapse rescue and water rescue (swift water, surface water and ice rescue).

The department is well equipped, but the number of technically trained personnel is limited. Key factors that drive this limitation include turnover and lack of advanced training. Members that have initial rescue training struggle to achieve advanced level training due to the need of training new members. Additionally, outside advanced level courses are difficult to achieve due to time constraints and distance of travel. Although there is a genuine desire to provide specialized rescue services to the community, the time commitment to maintain these programs is difficult for the majority of the members and the staff.

Vehicle/Machinery

Of all rescue services provided by the department, vehicle rescue is where the greatest emphasis is placed from training to equipment. The department maintains a vast amount of hydraulic, pneumatic, electric, and hand tools to perform vehicle rescue. Cribbing has been identified as a short-fall, but the department is moving forward with a plan to address this at the time of the site visit.

Internally, a member must attend a practice session three times before being allowed to deploy on the rescue truck. Skills check sheets are also in place for vehicle extrication. Machinery rescue is recognized as a potential service need, but there is little or no emphasis placed on this in the arena of training.

Rope

The department has the minimum equipment needed to effectively perform low-angle or operations level rope rescue. It was unclear at the time of the site visit if the department maintained a rope tracking log for life safety rope as required in NFPA 1983. Regarding personnel trained to this level, there are only a few members that have achieved this level of training. For the members that have this training, a consistent training schedule has not been provided or followed to ensure their skills have been maintained.

Tower and Antenna

The department is not trained or equipped for this type of rescue. They do however, have a system in place to activate Stateline, an entity trained and equipped to perform this type of rescue.

Confined Space

Equipment for this area of rescue is adequate, although portable radios are the primary means to communicate from within a confined space. These radios are intrinsically safe, but various spaces and their construction features limit reception. Additionally, these radios do not provide open circuit continuous communications as found in hard-wire systems which are best suited for these operations. During personnel meetings it was clear that there is a definitive gap in training, similar to rope rescue. There are only a few members that have gained initial training, with continued training seldom conducted.

The department should re-evaluate its ability to realistically provide operations level confined space rescue. If it is determined that this service shall continue, additional members must be trained so that an adequate number of trained personnel can assemble to safely and effectively perform this type of rescue. All points of a permit required confined space program as defined in 29 CFR 1910.146 must be followed with specific attention given to subpart K, rescue and emergency services.

Trench and Structural Collapse

These disciplines are trained to the awareness level, which is suitable for the department.

Water

Few members are trained to perform water rescue. This includes ice rescue and boat operations. No members are trained in swift-water or rescue diving, but the department has a system in place to notify agencies that provide these services.

Training and Educational Compliance

The state of Wisconsin has a rescue certification system in place; however the department does not have members that have achieved these state certifications. For initial specialized rescue training, the department typically sends its members off-site with the exception of vehicle extrication.

For scheduling internal training, officers put a calendar together a year in advance and submit it to the assistant chief. There was some disconnect regarding the execution of the training sessions outlined in

the submitted calendar that appeared to be a combination of competing schedules, other department priorities, limited instructors, or limited participation.

Continued training/education for specialized rescue training with the exception of vehicle extrication is not consistently conducted. Rescue members have cross-trained successfully with EMS personnel during vehicle rescue training sessions.

Recommendations:

- The department should ensure all members are trained to the awareness level of each technical rescue discipline.
- The department should focus on achieving state certification for rescue services delivered, or develop a standardized in-house certification program that follows NFPA 1670.
- The department should continue its focus on vehicle rescue and ensure it improves its capability for machinery rescue.
- Ensure all life safety rope and associated hardware have usage tracking logs as defined in NFPA 1983.
- Ensure operations level training is achieved by more members for rope and water rescue.
- The department should re-evaluate its ability to realistically provide operations level confined space rescue.

Support Programs

Although the delivery of fire suppression and emergency medical services is at the core of each department's mission, additional core activities are necessary to support every emergency services agency. These activities provide the basis for public safety education, fire prevention, code enforcement and dispatch/communications functions.

Life Safety Services

An aggressive risk management program, through active fire and life safety services, is a fire department's best opportunity to minimize the losses and human trauma associated with fires and other community risks.

"The National Fire Protection Association recommends a multifaceted, coordinated risk reduction process at the community level to address local risks. This requires engaging all segments of the community, identifying the highest priority risks, and then developing and implementing strategies designed to mitigate the risks."¹⁰

WFD understands the importance of fire prevention and public education and appreciates their role in the planning process of a community with diversified zoning including residential, commercial, institutional and industrial properties.

A fire department should actively promote fire resistive construction, built-in warning and fire suppression systems, and effective administration of applicable fire codes and ordinances. Doing so not only protects an individual property owner's interests, but those of community safety and economic viability overall. The essential components of effective code enforcement include:

- Adoption and administration of appropriate codes and ordinances
- Active participation in new construction building permit fire and life safety plans reviews
- Completion of inspections pursuant to building permit issuance
- Inspection of existing commercial and high risk occupancies
- Enforcement and management of code related activities

The City of Whitewater has adopted NFPA 1 as their model code and does not have any additional sprinkler requirements over and above that code. The areas outside the city have not adopted a formal fire code but WFD inspectors follow NFPA during inspections and plans review. There is no formal citation process in place. WFD inspectors are involved in new commercial construction in that they require plan submittal to the fire department (not always done) inspection prior to issuance of a

¹⁰ Kirtley, Edward, *Fire Protection Handbook*, 20th Edition, 2008, NFPA, Quincy, MA.

Certificate of Occupancy, observed flow tests for sprinkler systems and observed testing of public assembly fire alarm systems.

While no formal lock-box program is in place within the community (city or rural) there has been a recent push to require commercial properties that are alarmed to place a firefighter's lock-box at the main entrance to the facility. WFD personnel inspect all commercial occupancies twice annually and also provide courtesy residential inspections upon request. During 2012, the department conducted 1,476 initial inspections along with approximately 100 re-inspections. These inspections are conducted by paid-on-call personnel paid an hourly rate to perform these duties. No full-time personnel are assigned to this responsibility.

One of the most effective ways to prevent the occurrence of fires is by effectively educating the public so that they can minimize their exposure to fire and health issues and so that they can respond effectively when faced with an emergency.

WFD does not have an individual assigned as a formal public education officer and most education efforts are school-based or conducted upon request. Primary topics covered include residential exit plans, fire drills, smoke alarm use, general fire safety, fire extinguisher use, injury prevention, elderly care (EMS/rescue), CPR training (EMS/rescue) and courtesy blood pressure checks at the station. The department keeps a stock of multi-lingual literature related to fire prevention and life safety education.

A sometimes under-appreciated component of fire prevention programs overall is that of assuring that the cause of a fire that has occurred is effectively identified so that public education and code enforcement efforts can be targeted toward identified causes. Fire cause determination is not limited to intentionally cause incidents, but includes all forms of accidental fires, as well. Following is a review of fire investigation efforts in the study agencies.

WFD personnel provide limited initial scene control and reporting duties when a fire is suspected of being arson. Personnel from the Wisconsin State Fire Marshal's office have been given authority to investigate all suspicious fires and are called for assistance throughout the WFD response area. Minimal training in scene control, evidence preservation and collection and initial fire cause and origin has been provided to all department personnel, but only those identified specifically as fire investigators have received formal scene control and evidence quarantine training. Regarding juvenile arsonists, there is no local Juvenile Firesetter program currently in place although department personnel expressed a desire

to initiate such a program.

Recommendations:

- Department personnel should work with the townships or the county to adopt and implement a formal fire code that applies to all properties within the department's jurisdiction.
- The department should work with the city to ensure that all commercial construction plans are reviewed by the fire department prior to issuance of a permit.
- The city should consider hiring a full-time inspector to ensure that all commercial and multi-family rental occupancies are inspected on a regular basis following a formal inspection program.
- The department should work with both the city and the rural townships to implement a formal citation process for failure to follow fire code regulations.
- All department personnel should receive formal training on scene control and evidence collection/quarantine.
- Formal fire investigators should continue their formal education through the National Fire Academy and International Association of Arson Investigators (IAAI).
- The department should work with the city and the county to establish a regional Juvenile Firesetter program.

Communications

WFD is provided communications and dispatch services through the Whitewater Police Department (WPD) Communications Center. The dispatch center is the primary Public Safety Answering Point (PSAP) for the City.

The Communications Center is managed under the police department command structure without formal representation from the fire department. A police Captain is assigned the responsibility for the center, along with several other areas of responsibility, but a Support Services Manager and a Records Communications Coordinator provide day-to-day supervision of the center.

Only one dispatcher/telecommunicator is on duty at a time and this individual is responsible for receiving both emergency and non-emergency calls, entering information into the Computer Aided Dispatch (CAD) system and then dispatching and tracking response units.

The center handles over 3,800 incoming 9-1-1 calls each year, or a daily average of 10.6 calls. There are two incoming 9-1-1 telephone lines for three trunks. The center's system is compliant with Phase Two cellular location identification.

Formal call answering time standards have not been adopted and little in the way of quality assurance is being conducted. The center does not provide Emergency Medical Dispatch (EMD) for the prioritization of medical responses or other prioritized dispatch other than a simple 1 to 4 prioritization based on dispatch impression of the severity of the call. Performance objectives should be established and measured.

NFPA 1221, Section 6.4.2 Installation, Maintenance, and Use of Emergency Services Communications Systems section 6.4.3 specifies that, "Ninety-five percent of emergency dispatching shall be completed within 60 seconds." These or similar standards should be considered for formal adoption and performance monitoring should be conducted regularly with reports provided to the fire chief. If these standards are adopted, the center should begin reviewing call processing time at the 95th percentile.

Computer-aided dispatch software is available to the dispatcher. Call processing and dispatch is handled quickly, with automated processes that take place in order to identify the correct unit or stations to dispatch. The CAD system is manufactured by Cardinal™, and is a table-based system running on a Windows™-based SQL server. The system does not currently provide geographic location or mapping information to response units and no mobile data terminals (MDT) are in use in fire or EMS/rescue apparatus.

Notification of incidents takes place by *station dispatch*, without programmed assignment of specific apparatus quantities and types. Apparatus availability for the department is not tracked automatically by the CAD system and back-up assignments are unable to be determined with the current software. Computer tracking of dispatch, arrival and control times are available and tracked by CAD as well.

Dispatch of apparatus within the fire stations takes place by encoded station radios. At this time, no direct line in-station printers are planned for the future. This is advisable, since it would provide two redundant methods for transmitting alarms (an enhancement in credit for ISO ratings). Field personnel are notified by pocket-sized tone-encoded radio receivers. The CAD system does not currently include an interface for direct and automated creation of alphanumeric paging or texting to cellular phones.

The dispatch center has adequate contingency plans for system failure. Back-up power is in place with the ability to transfer 9-1-1 calls to Walworth County in the event of system failure. A back-up transmitter and a functionally redundant dispatch site are available, included in an emergency management patch trailer for radio communications. Although no exercises of the contingency plan have been conducted, an actual event required evacuation of the dispatch center and subsequent use of backup procedures with the exception of the patch trailer from Walworth County. Evacuation and transfer drills should be conducted at least annually to train dispatchers for emergency relocation and other system failure procedures.

Recommendations:

- The communications center should implement quality performance measures for call pick-up and call processing in accordance with industry standards.
- A formal quality assurance/improvement program should be developed for the communications center to ensure compliance with established performance measures.
- The communications center should consider additional staff on each shift so that a higher degree of prioritization can be assigned to emergency incidents at dispatch.
- Emergency Medical Dispatch (EMD) should be re-implemented in the communications center (may be staffing dependent).
- The city should investigate the potential for text messaging and alphanumeric paging of incidents to reduce repeated radio traffic from responders.
- The city should work with the communications center and the fire department to investigate technological advances that will assist with dispatch and resource utilization throughout the response area.

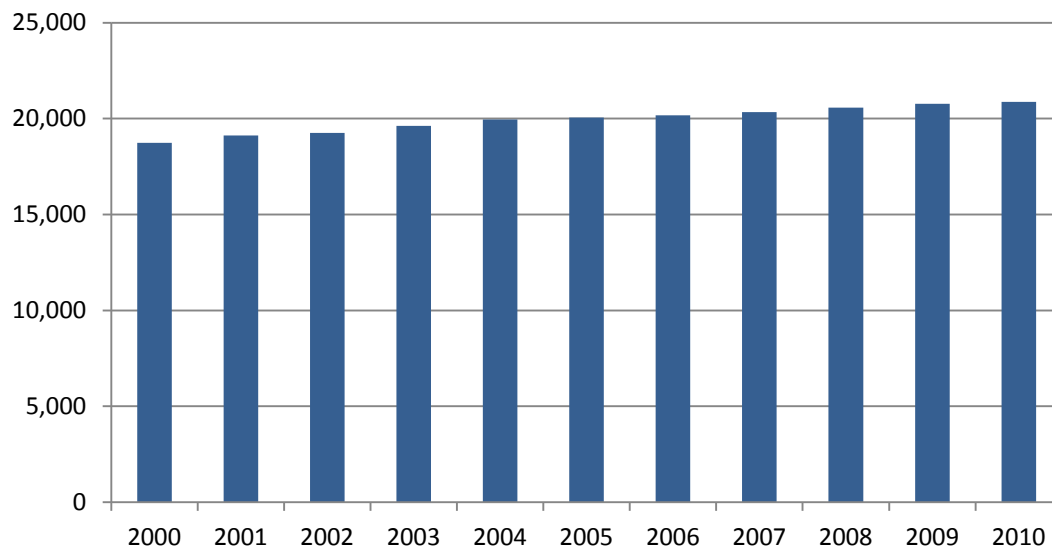
Section II – Future Service Demand Projections

While the preceding sections of this report provide an overview of current conditions within the WFD service area, this section is intended to evaluate what the future emergency services delivery system should be prepared for given development and population trends. In order to project what future service demand might be, ESCI looks at population history, demographics, community risk, and planned development.

Population History and Projections

The process of forecasting growth within any given community begins with an overview of historical growth and demographic changes. The figure below illustrates the general population growth over the last decade across the entire service area as a whole.

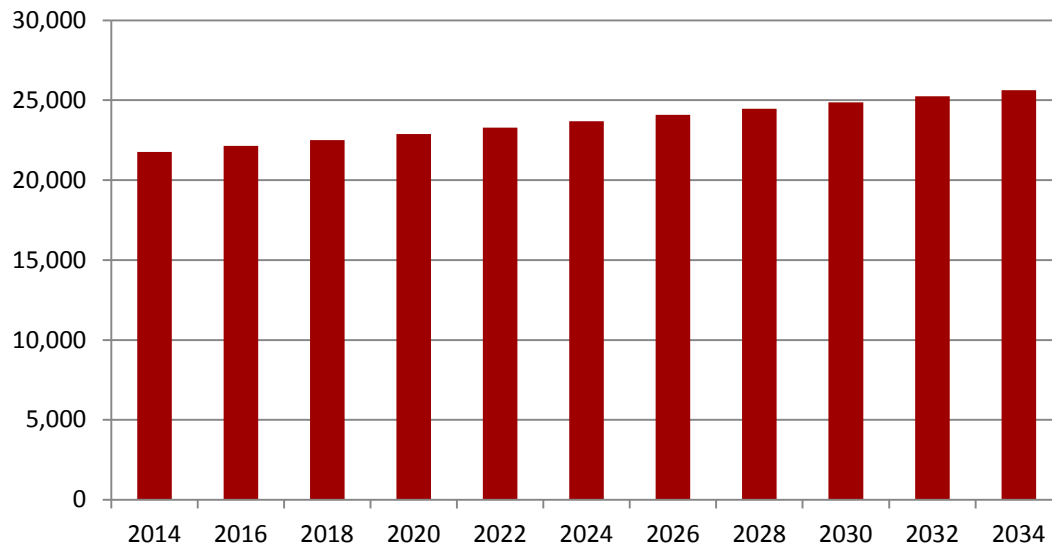
Figure 43: Population History - Entire Service Area



Although the population of the study area has grown only slightly, there are also seasonal variations due to the UWW campus which brings an additional 10,000 to 12,000 young residents to the community from August through May. This increase is not noted in the figure above since those transient students are not included in census number, but those students will be considered later in this report as future service demand is projected.

Given the historical population growth combined with information obtained from the City of Whitewater and UWW, ESCI has generated a population projection for the next 20 years from which to develop future service demand projections. This is illustrated in the figure below.

Figure 44: Population Projection - Entire Service Area



Based on historical growth, over the next two decades the fire department will be tasked with providing service to a slightly increasing population that will surpass 25,000 persons (and potentially as many as 30,000 persons). As the population continues to grow, so too will the service demand experienced by the department. Planning should begin now to address how to best handle the increasing service demand.

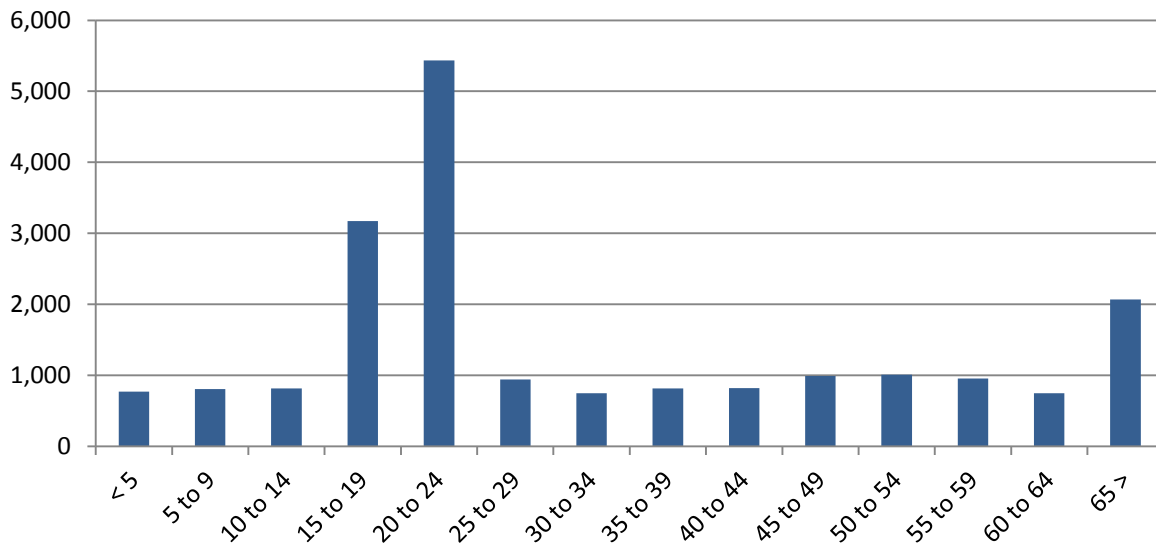
Community Risk Analysis

The fire service assesses the relative risk of properties based on a number of factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to effectively mitigate a fire emergency. Staffing and deployment decisions should be made with consideration of the level of risk within geographic sub-areas of a community.

Unlike medical responses that focus on human life, fire incidents are intended to protect property in addition to life. Property values translate into tax revenue for municipalities and the protection of that valuation is imperative to the success of a fire department.

The median age as of the 2010 Census was 41.6 for the region compared to a median age within the City of Whitewater at only 21.9. This is compared to a median age of 37.2 nationally. The following figure illustrates how the population is distributed across the various age categories.

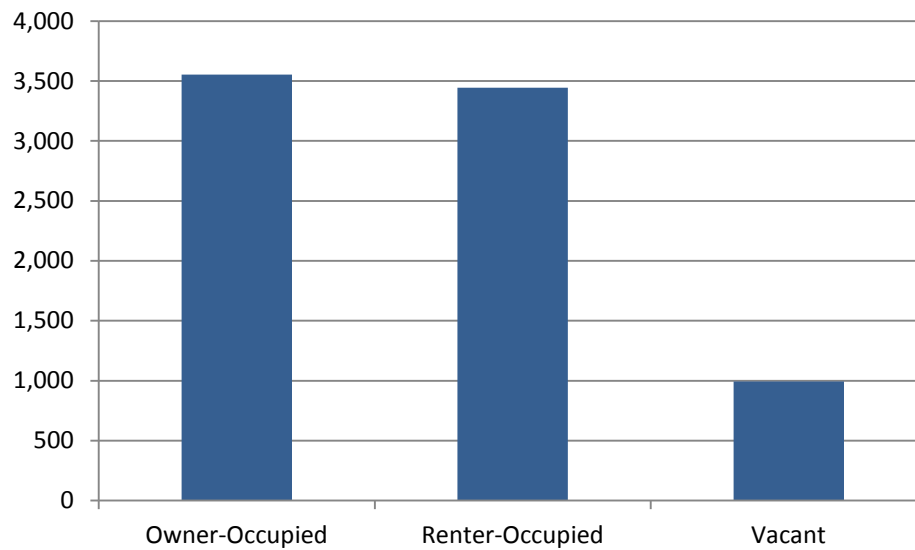
Figure 45: Population Distribution by Age - Entire Service Area (2010)



Based on the figure above, only 3.8 percent of the population is below five years of age while 10.3 percent of the population is over the age of 65. These two age groups pose the greatest historical risk for injury or death due to medical and fire related incidents. Given the combined percentage of only 14.1, the department, while busy with university-related and general community incidents, should not see a significant impact of age-based incidents.

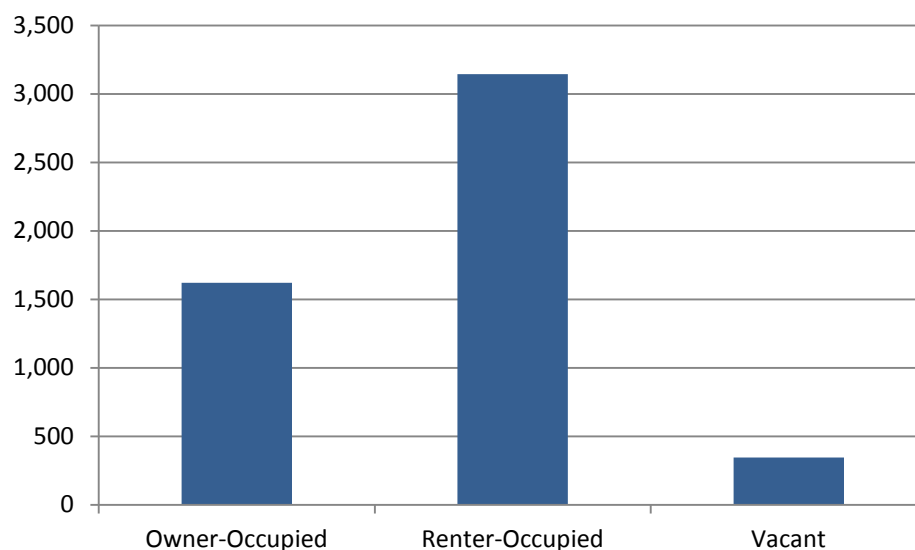
ESCI also evaluated the existing housing occupancy throughout the overall response area. It is common for areas that are experiencing depressed socioeconomic conditions to have higher vacancy and/or renter-occupied housing stocks. Conversely, resort areas or areas with institutions for higher education can commonly have a high number of rental occupancies as well, as is the case in Whitewater. Quite often, high vacancy or renter-occupied rates suggest a higher service demand than would be generally expected. The following figures display the housing occupancy rates for the entire service area as well as the City of Whitewater separately.

Figure 46: Housing Occupancy - Entire Service Area (2010)



The vacancy rate throughout the entire service area is generally less than 10 percent of the total housing stock. This suggests a relatively stable economic condition, which should reduce overall service demand. While the renter-occupied rate is high for the entire area, a vast majority of these properties are located within the City of Whitewater as illustrated below.

Figure 47: Housing Occupancy - City of Whitewater (2010)



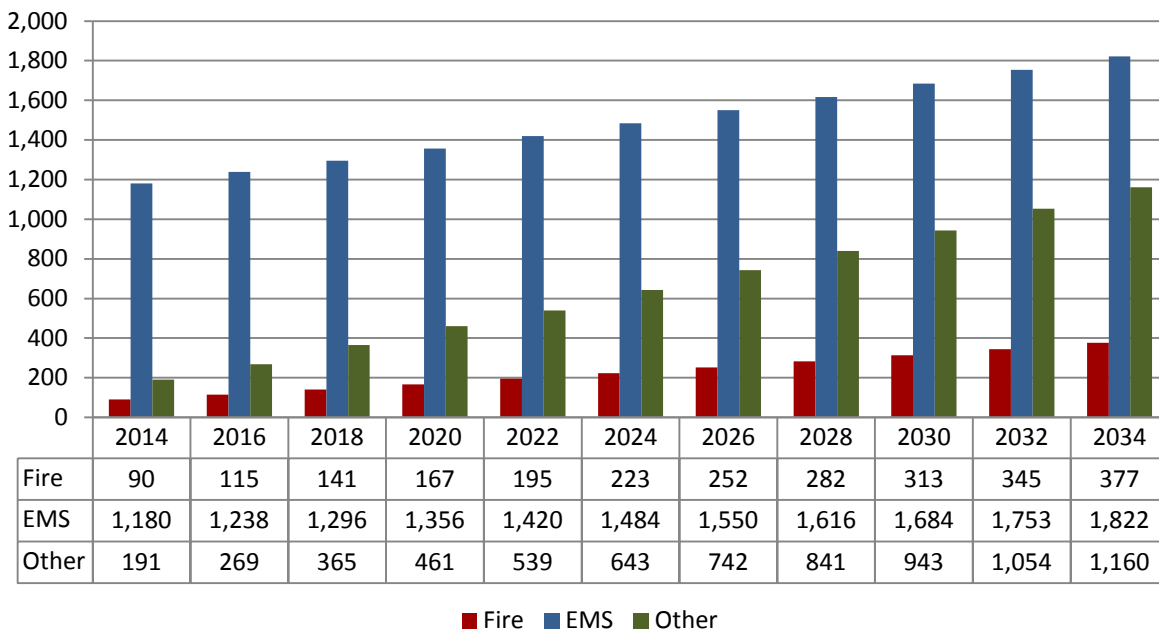
Although a high rate of renter-occupied properties would generally indicate the potential for higher service demand, the fact that the City of Whitewater hosts the University of Wisconsin–Whitewater

decreases the overall response potential. These properties, however, do generate a different *type* of service demand (alcohol abuse, psychiatric issues, fire alarms, smoke reports, etc.) that the department should be adequately prepared for.

Service Demand Projections

In evaluating the deployment regarding facilities, resources, and staffing, it is imperative that consideration be given to potential changes in workload that could directly affect such deployment. Any changes in service demand can require changes and adjustments in the deployment of staff and resources in order to maintain acceptable levels of performance. For purposes of this study, ESCI utilized population projections obtained through census data and multiplied these by a forecasted incident rate derived from historic incident per capita rates to identify workload potential through the year 2034. The results of the analysis are shown in the following figure.

Figure 48: Total Workload Forecast



The increase in actual fire incidents is forecast to be relatively low during the study period, a reflection of trends for fire incident rates per capita and believed to be a result of improvements made in building codes and public fire education during the last several decades. EMS is expected to continue to be a predominate factor in service demand as the population ages and increases in overall numbers, while

other emergency service calls not involving actual fires are also forecast to increase, in part due to the use of automatic alarm and water flow systems.

Section III – Future Service Delivery Models

Although the foregoing sections of this report focused primarily on the conditions that currently exist within WFD, the intent of this study is to combine that evaluation with a look into the future and provide policy makers with information necessary to carry the system forward over the next 10 to 20 years. This portion of the report provides recommendations related to the deployment of facilities, apparatus and personnel with a focus on future service delivery and an improvement in overall efficiency within the system.

Response Performance Standards and Targets

The current system of defining desired response performance is through the use of three classifications that are common to the fire services industry; urban, suburban and rural. These classifications are based on population density:

- Urban – Greater than 1,000 population per square mile
- Suburban – Between 500 and 1,000 population per square mile
- Rural – Less than 500 population per square mile

Given the area to which WFD responds for both fire and EMS incidents, the department should establish response performance objectives that correlate with NFPA 1720 recommendations as identified below.

Figure 49: Recommended Response Performance Objectives

Population Density	Recommended Response Performance	
	Objective	
Urban	5:00 @ 90 th Percentile	
Suburban	10:00 @ 80 th Percentile	
Rural	14:00 @ 80 th Percentile	

It should be noted here, however, that these performance objectives are intended for fire response and do not necessarily also apply to EMS response performance. Unlike the fire service, there is no nationally published *standard* for EMS responses. While the American Heart Association and the American Red Cross have identified that only four to six minutes without oxygen is sufficient to significantly reduce the likelihood of resuscitation from a cardiac arrest, there is little guidance on the response performance for EMS resources since they are delivered in such varied methods across the country. Since WFD is in fact a fire-based EMS system, ESCI has used the guidance provided within *NFPA*

1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments regarding the arrival of EMS resources in establishing performance measures for these types of incidents. *NFPA 1710* states,

“...The fire department's EMS for providing a first responder with AED shall be deployed to provide for the arrival of a first responder with AED...within a 4-minute response time to 90 percent of the incidents... [sic] When provided, the fire department's EMS for providing ALS shall be deployed to provide for the arrival of an ALS company within an 8-minute response time to 90 percent of the incidents [sic]”¹¹

While the standard also address what the fire service believes to be the minimum necessary staffing and credentialing of EMS personnel, ESCI believes that is better left to local medical control and those more intimately familiar with the local system.

Long-Term Strategies

The intent of this report section is to provide policymakers with options for future service delivery with a focus on facilities, apparatus and personnel.

Facilities

As described previously, WFD operates from a single facility located within the City of Limits of Whitewater and is able to provide an effective response to a vast majority of historic service demand from the current location. While the existing station was not intended to provide facilities for continuous staffing (resident, part-time or full-time) the station is in good shape and is suitable for current volunteer operations.

Given that service demand for WFD, particularly EMS service demand, is projected to increase over the next two decades, it is presumable that the department will be required to shift to some type of consistent staffing in the future to meet that demand. If this is the case, the current station will need to be reconfigured to accommodate those staff. This may include updated living areas such as day rooms, office space, sleeping quarters and personal hygiene areas. Unfortunately, space on the existing site is limited. Any expansion of the facility would require additions to the west side of the building, which is current utilized for parking as illustrated in the figure below.

¹¹ *NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments*. 5.3.3.3.2.

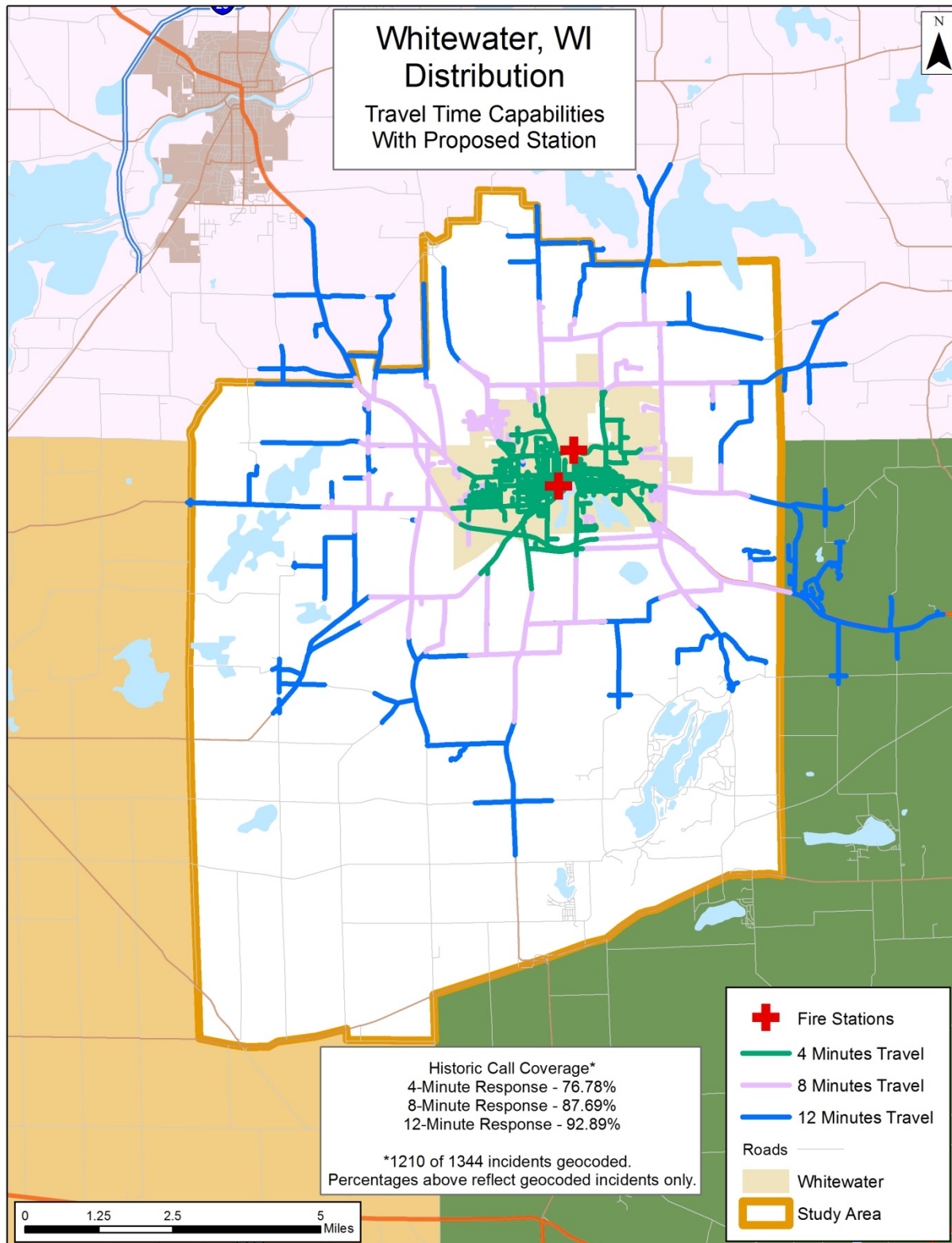
Figure 50: Existing Station with Westside Parking Area



Since ESCI did not conduct a structural, architectural or engineering evaluation of the current facility, the city should consult qualified experts to determine if additional vertical space is a viable option. Given the current placement of the station as well as construction type and layout, it may not be feasible to add living/office space as a second floor.

As an alternative to renovation of the existing station, WFD has tentatively examined the potential for moving operations to an alternate location in the vicinity of N Jefferson and Starin Rd. The figure below illustrates this potential location in comparison to the current station.

Figure 51: Potential Alternative Station Location



Considering the new location, certain changes may occur in the department's ability to provide service in line with historical performance. For comparison purposes, ESCI examined travel models based on the previous distribution analysis to determine the potential impacts of relocating the fire station. The comparisons are presented below.

Figure 52: Comparison of Potential Response Performance

	4-Minute	8-Minute	12-Minute
Current Station Location	75.79	87.52	92.89
Alternate Station Location	76.78	87.69	92.89

As can be seen from the figure above, the alternative station location would neither significantly improve nor negatively impact the ability of the organization to effectively meet its historic service demand.

Another alternative available to the department and to the city is to separate the operations of fire from Rescue/EMS. While this potential alternative was seen by many departmental members as detrimental to the future of the organization, as described during stakeholder input sessions, it is a viable alternative from a facilities perspective. Considering that a majority of the departments service demand is medical in nature and the fact that most of the medical service demand is occurring in the core of the response area, it would be beneficial for those services to remain in close proximity to the core of Whitewater.

The question would then remain as to the home of fire and technical rescue operations. Given the current distribution of historic service demand, it would be feasible for fire and technical operations to be housed at either of the previously described locations.

Apparatus

Given the size of the department's response area and the numbers and types of structures present within the community, certain pieces of apparatus are necessary for WFD to maintain its current ISO rating. However, maintaining separate apparatus for city versus township responses is redundant and causes unnecessary expenses such as insurance, maintenance, fuel and replacement funding. While the city already has a capital improvement plan in place that includes all city-owned apparatus, the 'township' apparatus are not included but the city still pays for insurance and other costs.

Figure 53: Apparatus Replacement Recommendations

Unit	Year	Replacement Cost	Ownership	Redundant
Unit 1221 Engine	2010	\$550,000	City	No
Unit 1220 Engine	1996	\$550,000	City	No
Unit 1223 Engine	1996	\$550,000	FD	Yes
Unit 1250 Ladder	1990	\$900,000	City	No
Unit 1230 Tender	2005	\$340,000	FD	No
Unit 1232 Tender	2000	\$340,000	FD	Yes
Unit 1260 Squad	2004	\$140,000	City	No
Unit 1240 Brush	2012	\$140,000	FD	No
Unit 1274 ATV	2008	\$20,000	FD	No
Unit 1281 Ambulance	2005	\$155,000	City	No
Unit 1280 Ambulance	2001	\$155,000	City	No
Unit 1282 Ambulance	1997	\$155,000	City	Yes
Unit 1283 Ambulance	2010	\$155,000	City	No
Unit 1271 Rescue	2010	\$350,000	City	No

Based on the figure above, and the condition/age of redundant apparatus, ESCI recommends that those apparatus in red not be replaced in order to reduce overhead costs. Unit 1220 is currently overdue for replacement and planning should begin now to develop specifications for a new engine. Unit 1250, the aerial ladder is currently considered to be overdue for replacement and the city should begin the process now of developing specifications for a new apparatus that is suitable for the types of properties within the community, particularly those on the UWW campus.

While Unit 1232 is noted as redundant since most departments only have one tanker apparatus from a single station deployment, the department should work with ISO during its next re-rating to determine if their water supply scores would be negatively impacted by the removal of this piece of equipment. Unit 1282, the oldest of the department's four ambulances, is currently overdue for replacement as is Unit 1280. Based on the incident concurrency analysis presented previously, while a fourth EMS call does occur in some cases, it is ESCI's opinion that the fourth ambulance is unnecessary and should not be replaced. Unit 1280, currently the department's 'third out' ambulance, is considered to be overdue for replacement but, given the low incident rate, this unit can be held in reserve status but planning should begin now for replacement within the next five years. This is confirmed with the concurrency analysis presented previously.

Personnel

Risk-based critical tasking is a common method for determining the appropriate levels of staffing for departments based on specific incident types. It should be understood, however, that today's fire departments respond to many other incidents besides structure fires, including hazardous materials incidents, motor vehicle collisions, basic and advanced life support incidents, and non-structural fires.

The following figure illustrates the recommended number of personnel for structure fires of various risk levels. Low risk structures are small such as out-buildings; moderate risk structures are typical single-family residential buildings; high risk structures are multi-family or multi-story structures and maximum risk structures are those where special hazards may be present such as large commercial or manufacturing facilities.

Figure 54: Structure Fire Critical Tasking

Critical Task ¹²	Maximum Risk	High Risk	Moderate Risk	Low Risk
Attack line	4	4	2	2
Search and rescue	4	2	2	
Ventilation	4	2	2	
Backup line/RIT	4	3	2	2**
Pump operator	1	1	1	1
Water supply	1	1	1	
Utilities support	1	1	1	
Command/safety	2	2	2	1***
Forcible entry	*			
Salvage	*			
Overhaul	1*			
Communication	1			
Chief's aide	1	1		
Operations section chief	1			
Logistics	1			
Planning	1*			
Staging	1*			
Rehabilitation	1			
Division/group supervisors	2*			
High-rise evacuation	10*			
Stairwell support	10*			
Total Required	51	17	13	4 to 6

* At maximum and high-risk fires, additional personnel may be needed for these tasks.

** Backup line may not be required for certain incidents.

***Can often be handled by the first due officer.

¹² All tasks may be functional during the early moments of firefighting, but sometimes certain duties take place in sequence depending on the situation, thus reducing the total number of people needed.

Delivering sufficient numbers of personnel to the scene to accomplish all the various tasks that are required to effectively control an emergency is essential. The most labor-intensive incidents are structure fires. As is shown by the preceding figure, national criteria suggests at least 13 personnel be on scene of a fire in a single-family home for safe and effective operations. More personnel are needed as the size of the structure increases, the life risk increases, or when special hazards exist.

The following critical tasking for non-structure fire incidents are provided as examples for these specific incident types.

Figure 55: Non-Structure Fire Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Total	4

Figure 56: Hazardous Materials Incident Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Back-Up Line	2
Support Personnel	7
Total	13

Figure 57: Motor Vehicle Collision with Entrapment Critical Tasking

Task	Personnel
Command	1
Pump Operator	1
Primary Attack Line	2
Extrication	3
Patient Care	2
Total	9

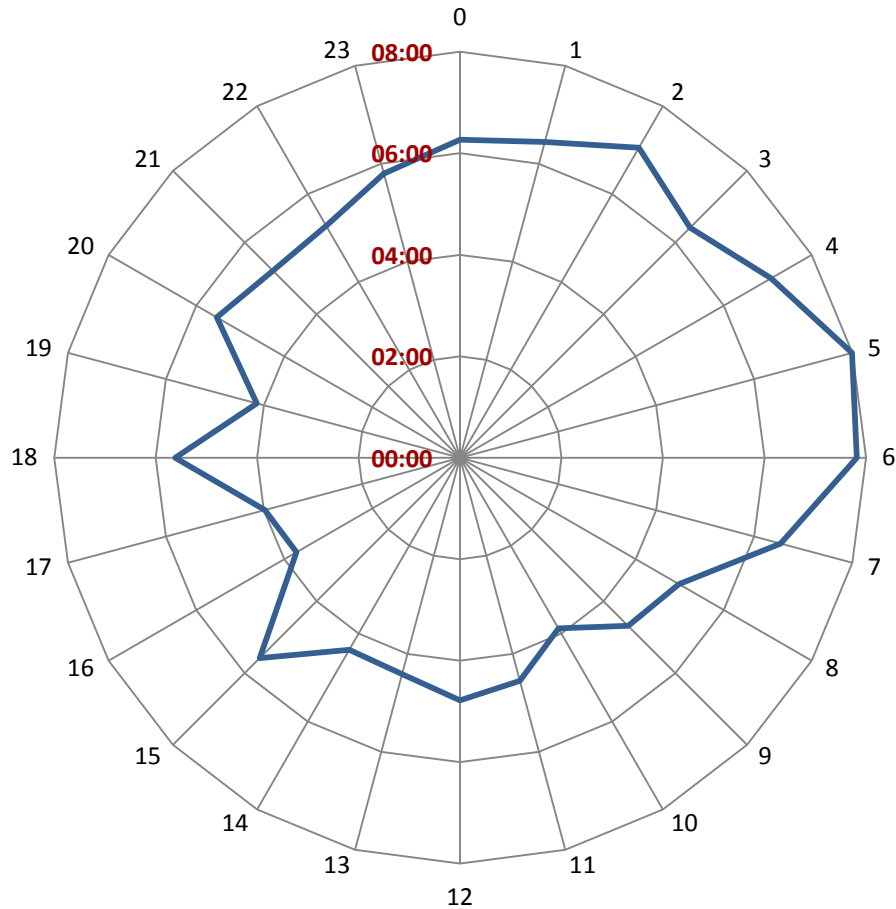
Figure 58: Emergency Medical Incident (Serious Incident) Critical Tasking

Task	Personnel
Patient Care	2
Support	4
Total	6

As discussed previously, WFD is a purely volunteer/POC department and, thus, does not have personnel on duty at the station in downtown Whitewater. The department's ability to produce personnel, however, is sufficient for most incidents as has already been discussed. Based on interviews with department personnel, one of the most critical issues facing the organization, however, was that of EMS staffing. Although the roster for EMS personnel is large, only a few of those members are truly considered active and reliable for day-to-day operations. Deployment of two personnel versus three has already been discussed and will not be repeated here but the city/department has several options for addressing future staffing issues.

With the development of any potentially new service delivery model comes the decision as to how to staff the units that will be delivering the services to the community. This section evaluates the potential staffing options available to the community from retaining an all-volunteer workforce (status quo) to a fully paid/career EMS system. It should be understood that, based on historical incident rates and staffing data, the staffing discussion provided here is primarily targeted at providing an enhanced EMS response rather than both EMS and fire. In order to determine which of the following strategies may be most appropriate, ESCI evaluated the department's turnout time based on an hour of day analysis. The figure below illustrates the department's EMS/Rescue turnout time average on an hourly basis.

Figure 59: Average Turnout Time by Hour of Day - EMS/Rescue



Given historical turnout time performance, the department's most difficult EMS/Rescue response period is during the overnight hours with several peaks throughout the day, most likely due to simultaneous incidents. This illustration should be considered when evaluating the most effective means of providing services to the community.

Maintaining a volunteer system, although substantially more cost effective, places an enormous amount of uncertainty on the level of service provided to the community. In lieu of paid/career staff, volunteer personnel should be scheduled to station duty to enhance the current practice of dedicated on-call duty to ensure that resources will be available for emergency response, at least the first incident dispatched. Alternatives to this type of on-duty staffing include resident programs, enhanced student programs, etc., all with little or no additional cost.

Resident programs have been successful in many areas across the country where response personnel and funding for paid positions are limited. Under this type of program, departments provide housing

and living conveniences to personnel that agree to reside at the station and accept an assigned duty shift. In essence, personnel provide response services in exchange for room and board in lieu of a salary. Many departments also pay these personnel minimal amounts to offset uncovered living and other expenses incurred by the individuals. This alternative, although inexpensive in personnel costs, may require capital expenditures for renovation of current facility or construction of new facilities to accommodate 24-hour staffing. In addition, departments implementing this staffing arrangement tend to experience increases in station operation costs such as utilities and an increase in consumables.

Assigned station duty staffing methodologies take many different forms and depend greatly on the members' abilities to spend time dedicated to station duty. These programs are typically more successful in urban and suburban areas where shift work allows personnel to dedicate time to the volunteer department with little or no expectation of pay. This program will usually increase station operating costs as mentioned previously and the increase is variable depending upon the total amount of time that is dedicated to station staffing.

Student programs function much like resident programs in that individuals are given room and board in exchange for assigned duty shifts. Entry-level training could be an obstacle for this type of program and turn-over is typically high as students move on after graduation and new students come into the system seeking assistance. For more information on this type of program, ESCI suggests that the departments contact the Carolina Beach Fire Department (North Carolina), which has utilized this type of program through the University of North Carolina–Wilmington for some time with significant success. This type of program would enhance the current student financial aid that is already in place and should be seriously considered as a means to address daytime staffing issues.

There is no model that is specific in this situation, and any future service delivery model should tailor the staffing methodology to meet the goals of the organization. In the case of WFD, historical staffing performance suggests that there is currently a significant problem generating sufficient EMS personnel to handle emergency incidents and this is likely to continue or worsen as time progresses and the community continues to grow and develop.

Paid Part-Time Staffing

When departments do not have the ability to staff stations and/or apparatus with volunteer, paid-on-call, resident, or assigned duty personnel during certain hours, and have the financial resources to pay

personnel, paid part-time staffing is often more practical and economical than progressing to full-time personnel.

With paid part-time personnel, scheduling can be accomplished to accommodate as many shifts as necessary based on availability of personnel, given a minimum requirement of time commitment and the agency's response needs. This staffing methodology allows organizations to provide personnel at the station and available for response without having the added financial responsibility of extended benefits. Many organizations use this type of staffing methodology as a temporary measure of how successful a more structured staffing system may be.

Paid part-time staffing systems allow organizations more flexibility than a full-time system while providing some administrative authority over personnel that is not afforded to volunteer or paid-on-call systems. The amount of funding and administrative time necessary for this process to function varies from system to system and will be determined by the number of personnel employed and the availability of said personnel. For more information on paid part-time staffing, ESCI suggests that the departments contact the Village of Tinley Park Fire Department (Illinois), which fully staffs three stations 24 hours per day as well as command and training personnel solely with part-time personnel. The only paid position in the Tinley Park Fire Department is that of fire chief.

Paid Full-time Peak Demand Staffing

For those agencies whose service demand is such that part-time personnel may not be the best scenario, peak demand staffing may be the preferred route. This staffing methodology utilizes full-time personnel; but rather than continuous staffing, personnel are on duty when service demand has historically been the highest or when staffing performance has historically been the lowest.

This type of staffing allows agencies the flexibility of staffing resources based on need rather than investing in a continuous full-time system that can be very expensive. For more information on this peak demand staffing with full-time personnel, ESCI suggests the departments contact Deptford Fire District (New Jersey), which staffs seven stations with peak demand personnel during the day and utilizes volunteers for night and weekend responses.

Paid Full-time Continuous Staffing

Full-time staffing is, by far, the most expensive of the staffing methodologies presented here. In many systems, as growth progresses, accompanied by increased service demand, the need for a full-time staffed agency increases. Full-time continuous staffing requires that agencies staff their facilities 24 hours a day in most cases. This is, however, based on service demand and the ability for personnel to be housed appropriately.

There are a variety of schedules available to agencies that progress to a continuously staffed department from 12-hour shifts on a rotating schedule, to 24-hour shifts on a typical 24/48 schedule, to any sort of schedule that provides for 24-hour staffing without producing excessive personnel costs through overtime and/or benefits.

Another issue to consider with paid, full-time continuous staffing is supervision. Although the individual department currently has a volunteer chief and line officers, these individuals would not be able to supervise full-time personnel 24 hours per day. In most cases, when full-time continuous personnel are put into place, there are also positions implemented to supervise those individuals in the form of a shift commander, operations supervisor, or other similar position. This should be taken into consideration if the city decides to progress to a paid, full-time continuous staffing model.

Short and Mid-Term Recommendations

The following list summarizes recommendations based on the individual agency evaluations contained within this report that are achievable in the short or mid-term, typically within a maximum of five years. These recommendations have been compiled into a prioritized list for easy reference. The prioritization system is as follows.

Priority 1 – Immediate Internal Safety

The recommendation deals with an improvement or initiative that solves an issue affecting the safety of firefighters and/or other personnel. These are not matters that simply make it easier to do a particular function but in fact make a currently unsafe situation safe.

- **No Priority 1 Recommendations**

Priority 2 – Legal or Financial Exposure

The recommendation resolves a situation that is creating or is likely to create the opportunity for legal action against the entity or its officials. It also may be a situation that could subject the entity to a significant expense.

- The department should abandon the practice of voting for Chief Officers and appointing line officers and implement a system of promotional testing for all positions.....5
- The city should work with the department to become more involved in the human resources element of the organization. If this cannot be accomplished, the city should sever its relationship with the department regarding personnel issues and classifying department members as city employees.5
- The Police and Fire Commission should be leveraged to act as an unbiased board for assistance with human resources needs.5
- ESCI recommends that the current Constitution and Bylaws for the Whitewater Volunteer Fire Department be rewritten to establish a single set of cohesive rules and regulations for membership, rules and regulations and disciplinary actions.7
- The city should consult legal counsel on the department’s practice of using the cities federal tax identification number to claim tax exempt status.12
- The city should ensure that the department has accurately filed the appropriate tax forms for a reasonable historical period.12
- The city should work with the department to reduce the fleet size by eliminating redundant apparatus, which will reduce insurance and operating costs.....17
- If the city is going to maintain insurance on all vehicles within the department, the city should be named on the title of each vehicle regardless of where funds came from to purchase it.17
- The department should ensure all members are trained to the awareness level of each technical rescue discipline.67
- Ensure all life safety rope and associated hardware have usage tracking logs as defined in NFPA 1983.....67
- Emergency Medical Dispatch (EMD) should be re-implemented in the communications center (may be staffing dependent).....72

Priority 3 – Corrects a Service Delivery Issue

The recommendation addresses a service delivery situation that, while it does not create an immediate safety risk to personnel or the public, does affect the department’s ability to deliver service in accordance with its standards of performance. For example, adding a response unit to compensate for a growing response workload or delivering training needed to allow personnel to deal effectively with emergency responses already being encountered.

- The department should implement minimum qualifications that follow NFPA 1001 for all personnel that will be actively engaged in structural firefighting. All personnel, including ‘Rescue’ personnel should undergo a pre-hire medical examination to ensure they are physically able to perform their required duties.30
- The department should implement minimum qualifications to hold officer positions, regardless of division.30
- All WFD personnel in all divisions should be trained to the First Responder Operations Level for hazardous materials.30
- The existing contracts for the provision of fire and ambulance services should be combined into a single contract for the provision of all emergency services with the rural townships.....60
- The department should assign one or more individuals to be responsible for the Public Access Defibrillation (PAD) program and to ensure that all equipment is appropriately placed, tracked, equipped and maintained.....62
- The department should ensure that all Rescue/EMS personnel are adequately trained and able to perform the necessary skills they are expected to perform.....64
- The department should focus on achieving state certification for rescue services delivered, or develop a standardized in-house certification program that follows NFPA 1670.67
- The department should re-evaluate its ability to realistically provide operations level confined space rescue.....67
- The department should work with the city to ensure that all commercial construction plans are reviewed by the fire department prior to issuance of a permit.70
- The communications center should implement quality performance measures for call pick-up and call processing in accordance with industry standards.72
- The communications center should consider additional staff on each shift so that a higher degree of prioritization can be assigned to emergency incidents at dispatch.72

Priority 4 – Enhances the Delivery of a Service

The recommendation improves the delivery of a particular service. For example, relocating a fire station to improve response times to a particular part of town or adding a piece of equipment that will improve the delivery of a service.

- Personnel that are not meeting their on-duty (signup) obligations should be placed on probation and/or terminated based on guidelines established within the department bylaws.28
- The department should reconsider its policy of staffing ambulances with three personnel and ensure that personnel are properly training and experienced to handle and/or supervise a two-person crew.28
- The department should continue the use of the box alarm system already in place and periodically review both internal and external physical and personnel resources to ensure that each card is up-to-date.60
- The department should continue its focus on vehicle rescue and ensure it improves its capability for machinery rescue.67
- Ensure operations level training is achieved by more members for rope and water rescue.67
- Department personnel should work with the townships or the county to adopt and implement a formal fire code that applies to all properties within the department’s jurisdiction.70
- The city should consider hiring a full-time inspector to ensure that all commercial and multi-family rental occupancies are inspected on a regular basis following a formal inspection program. 70
- The department should work with both the city and the rural townships to implement a formal citation process for failure to follow fire code regulations.70
- The department should work with the city and the county to establish a regional Juvenile Firesetter program.70
- A formal quality assurance/improvement program should be developed for the communications center to ensure compliance with established performance measures.....72
- The city should investigate the potential for text messaging and alphanumeric paging of incidents to reduce repeated radio traffic from responders.72
- The city should work with the communications center and the fire department to investigate technological advances that will assist with dispatch and resource utilization throughout the response area.....72

Priority 5 – A Good Thing to Do

The recommendation does not fit within any of the above priorities but is still worth doing and can enhance the department's morale or efficiency.

- The department should work with the city to develop a formal strategic plan to identify mid-term goals and objectives that address the department's strengths, weaknesses, opportunities and challenges/threats.9
- All department officers should meet monthly to establish short-term goals for the future and report on the status of those goals at the subsequent meeting.....9
- The city/department should implement an officer stipend program to compensate officers for their non-operational administrative and support duties and responsibilities.24
- The department should work with local medical direction to develop and implement a formal quality assurance/quality improvement program that provides feedback to field responders and allows for the direction of future training needs.....63
- All department personnel should receive formal training on scene control and evidence collection/quarantine.....70
- Formal fire investigators should continue their formal education through the National Fire Academy and International Association of Arson Investigators (IAAI).70

Fiscal Considerations

Given the preceding strategies and recommendations, ESCI has the responsibility to provide the City of Whitewater with certain projections of what any future service delivery models may cost. This section is intended to provide fiscal guidance related to future facilities, apparatus and personnel based on the project team's recommendations.

Apparatus

Several apparatus have been identified as being potentially redundant and should be considered for non-replacement. A number of these apparatus are not owned by the city, thus, changes to these specific apparatus would not impact the city's financial responsibilities to the fire department. Other apparatus, however, such as the fourth ambulance, could be eliminated from the current fleet and saving realized from a reduction in insurance, fuel and maintenance. The city already has a capital improvement plan in place and should continue to fund that plan based on the previously established criteria.

Staffing

The costs of any changes to the current staffing model will vary based on the type of system implemented moving forward. For the purposes of this report, ESCI has researched current practices and rates of pay for certain positions in order to provide the city with at least some level of guidance regarding future staffing costs.

The first and foremost position that would ensure the sustainability and accountability for the fire department, regardless of what future path is followed, is that of a Fire Chief. While ESCI is not necessarily recommending that a full-time Fire Chief be hired by the city, this position could be used to oversee any transition to an alternative service delivery model and would serve as the direct link between the city and fire department as an organization. The figure below provides policymakers with an estimate of the total cost of a full-time fire chief based on regional information should the decision be made to move in this direction.

Figure 60: Example Fire Chief Compensation¹³

	Regional Median
Base Salary	\$67,751
Benefits	
Social Security	\$5,183
401k/403b	\$2,575
Disability	\$474
Healthcare	\$6,507
Pension	\$4,336
Paid Time Off (PTO)	\$8,339
Total Compensation	\$95,165

It is presumed that the position of Fire Chief would be a full-time city employee but this could just as easily be accomplished with a part-time position as well given the current staffing structure of the department. If the department moves forward with full-time or other on-duty staffing scenarios, it may benefit the city to have an individual charged with overseeing those personnel on a day-to-day basis.

Figure 61: Example Emergency Medical Technician Compensation¹⁴

	Regional Median
Base Salary	\$29,410
Benefits	
Social Security	\$2,250
401k/403b	\$1,118
Disability	\$206
Healthcare	\$6,507
Pension	\$1,882
Paid Time Off (PTO)	\$3,620
Total Compensation	\$44,997

¹³ Obtained from <http://swz.salary.com/salarywizard/Fire-Chief-Salary-Details-Whitewater-WI.aspx?hdcxbonus=off&isshowpiechart=true&isshowjobchart=false&isshowsalarydetailcharts=false&isshownextsteps=false&isshowcompanyfct=false&isshowaboutyou=false>. Accessed 3 September 2013.

¹⁴ Obtained from <http://swz.salary.com/salarywizard/Emergency-Medical-Technician-Salary-Details-Whitewater-WI.aspx?hdcxbonus=off&isshowpiechart=true&isshowjobchart=false&isshowsalarydetailcharts=false&isshownextsteps=false&isshowcompanyfct=false&isshowaboutyou=false>. Accessed 3 September 2013.

The median hourly rate for an Emergency Medical Technician is reported to be approximately \$14. This compares to the current rate of \$17.50 - \$20.00 per hour in addition to an \$8.00 flat fee for a response and \$1.00 per hour to be on-call. The figure below illustrates how an EMT-Paramedic compares.

Figure 62: Example EMT-Paramedic Compensation¹⁵

	Regional Median
Base Salary	\$36,833
Benefits	
Social Security	\$2,822
401k/403b	\$1,402
Disability	\$258
Healthcare	\$6,507
Pension	\$2,361
Paid Time Off (PTO)	\$4,540
Total Compensation	\$54,777

The median hourly rate for an Emergency Medical Technician is reported to be approximately \$18. WFD does not currently use EMT-Paramedic personnel within the department but, rather, relies on these personnel to respond from surrounding agencies in 'ALS Intercept' vehicles. Much discussion has been undertaken about the potential need for Advanced Life Support (ALS) or EMT-Paramedic personnel in the City of Whitewater and little in the way of hard evidence supports or contradicts those that support that need.

The nearest and most frequently used paramedic-level service is located at Fort Atkinson Memorial Hospital and these personnel, on-duty 24-hours per day, respond to Whitewater in an ALS Intercept vehicle, not a transport ambulance. If transport is necessary, the EMT-Paramedic simply moves his ALS equipment onto the WFD ambulance and attends the patient to the hospital in conjunction with WFD personnel. Based on the quickest route from Fort Atkinson Memorial Hospital to the City of Whitewater, the distance is approximately 10.3 miles and, in normal traffic, can take up to 15 minutes of travel time, not including the amount of time necessary for the personnel to leave the emergency department and make their way to the response vehicle.

¹⁵ Obtained from <http://swz.salary.com/salarywizard/EMT-Paramedic-Salary-Details-Whitewater-WI.aspx?hdcbxbonus=off&isshowpiechart=true&isshowjobchart=false&isshowsalarydetailcharts=false&isshownextsteps=false&isshowcompanyfct=false&isshowaboutyou=false>. Accessed 3 September 2013.

In addition, the ALS Intercept is not always immediately dispatched to incidents within the WFD response area since no Emergency Medical Dispatch or other prioritization of 911 calls is in place. This can further delay ALS response. To bridge this deficiency, all personnel within WFD (EMS/Rescue division) will be credentialed to the Advanced EMT level in the near future. This advanced credential will allow the department to provide a higher level of care but still does not reach the level of EMT-Paramedic. Whether or not the community *needs* paramedic-level care is a question that policymakers must ask their constituents and then ensure that the community is both able and willing to pay for that level of service to be provided.

DHS 110.50 requires that an EMT-Basic transport ambulance be staffed with at least one EMT-Basic and one EMT-Basic with a training permit. In addition, the rule requires that an EMT-Intermediate transport ambulance be staffed with at least one EMT-Intermediate and one EMT-Basic. For a paramedic transport ambulance, the rule requires that the ambulance be staffed with at least one EMT-Paramedic and one EMT-Basic. In regards to staffing of additional resources, the rule states that, "...An ambulance service provider may only deviate from the ambulance staffing requirements under sub. (1) if all 9-1-1 response ambulances are busy and the service has an approved reserve ambulance vehicle and one of the following conditions apply: ...An ambulance service provider may staff and operate reserve ambulances at a lower service level appropriate to the licensure level of the available staff if it obtains approval from the department. The reserve or back-up ambulance shall be stocked and equipped appropriately for the level of service provided. The ambulance service provider shall request approval through submission of an operational plan amendment."¹⁶

In other words, if the city/department wishes to implement an advanced level of care to ensure that either Advanced EMT or EMT-Paramedic personnel are available within the primary response area, it can do so with the establishment of a single ALS provider (AEMT or EMT-Paramedic) partnered with a BLS provider (EMT-Basic) in the primary response ambulance and provide BLS (EMT-Basic) services to all subsequent simultaneous incidents, if approved to do so by the State of Wisconsin. This may help the city/department to accomplish its goal of providing an advanced level of care while doing so in a cost effective manner.

To summarize, if the city were to move ahead with the implementation of a full-time Fire Chief as well as 24-hour ALS coverage, supplemented by duty personnel or other POC staffing, an annual cost of

¹⁶ Wisconsin Department of Human Services regulation 110.50.

approximately \$301,000 could be expected. This includes the Fire Chief and 3.75 FTE's for 24-hour EMT-Paramedic coverage, accounting for absences and use of PTO. This also presumes that the BLS personnel will continue to be compensated accordingly and that on-call personnel are transitioned to duty personnel through one of the strategies noted above. This type of system could also consider the use of a smaller vehicle for ALS first response with the transport ambulance responding later using the current on-call staffing methodology.

Facilities

The most difficult projection to make in this project is that of facilities due to the variables that may or may not come into play regarding apparatus and/or staffing changes in the future. As already mentioned, a number of apparatus could be removed from the fleet, which would reduce the space requirements within the apparatus bays at the current station. This space could be utilized to improve flow within the apparatus area itself or could be repurposed to provide for living areas for student, resident, peak demand or full-time personnel. The current station is not suitable for continuous staffing and any changes to the staffing model will require at least some level of renovation. At this time, the costs of those renovations cannot be estimated.

Cost Avoidance and Recovery Efforts

Given the current methods of billing for transports, the city could potentially increase overall revenue by increasing the level of service provided. Under the current practice, BLS transports are billed by the city with estimated total revenue in 2012 of \$550,000 based on an established fee schedule through the city. This translates into approximately \$489.32 per incident in 2012. Understanding that not all incidents result in a transport, the actual per transport rate would be much higher. Under the current system, the department can only bill for BLS transports. If a patient requires ALS care and a paramedic intercept is summoned to assist with the transport, then the ALS providers bills for the transport and pays WFD a set amount for providing the vehicle.

If WFD were to enhance their level of service to ALS, many more transports could be billed according to the ALS rates spelled out in the city's fee schedule. This could help to increase overall revenue for the department in regards to ambulance transports and help to offset the costs of providing the higher level of service.

Conclusion

The department as it stands today, while providing services that meet the community's expectations, has several issues that must be resolved for simple sustainability. The City of Whitewater has no oversight or management capacity within the current governance structure and has several options moving forward to correct this deficiency. The most critical need until a final decision is made regarding future governance is the establishment of a formal contract between the city and WFD. This, in and of itself, may be difficult without the fire department first establishing itself as a legal corporation with the State of Wisconsin. ESCI would suggest that the city work with legal counsel to assist the fire department in accomplishing this task and then formalizing a contract for services that includes specific performance measures and financial auditing requirements. Without this contract, the city faces significant legal liability.

Another option for the city is to relinquish all responsibility for fire protection and EMS throughout the response area and delegate this authority and responsibility to WFD. This would entail abandoning the current practice of recognizing WFD personnel as city employees, halting the practice of paying for apparatus, equipment and insurance and transferring ownership of all current apparatus and equipment to the fire department once it is legally established with the Wisconsin Department of State, Corporations Division. A contract would still need to be established and executed between the city and the fire department that includes the same performance measures and financial auditing requirements mentioned previously.

The final option for the city is much more drastic but would resolve a number of issues that currently exist; severing the existing relationship with WFD and creating a municipal fire department. Since the city already owns the facility and a majority of the apparatus and equipment and currently recognizes fire department personnel as city employees, this strategy would allow the city to maintain greater management and organizational control over the department. Existing issues relating to hiring, termination, discipline, etc. would be handled through the city's personnel office and all financial duties and responsibilities would be handled through the city's finance director. In the future, all contracts for service, even in the rural areas, would be negotiated and financed through the city rather than the existing volunteer fire department. This type of structure would ensure that personnel in management positions within the organization met minimum qualifications and requirements and would eliminate the existing practice of voting on supervisory positions, as well as new personnel.

The current apparatus fleet should be further evaluated to ensure that sufficient apparatus are available without unnecessary redundancy. All apparatus should be available for all incident responses rather than selective incidents based on geographic location.

As a means of improving response performance, particularly for EMS/Rescue responses, the city/department should seriously consider station duty, resident or enhanced student programs to provide for a more stable availability of personnel. After an adequate period of time, the program should be re-evaluated to determine its effectiveness before moving to a more expensive paid part-time or full-time staffing model.

Regardless of the strategy chosen by the city for the future of Whitewater Fire Department, each recommendation presented throughout this report is still relevant and can be applied to each scenario. The ESCI project team began collecting data and information for this project in May of this year and the review and analysis necessary to complete this project has taken nearly four months. It is ESCI's sincere hope that the information presented in this document is found to be useful for policymakers as they contemplate the future of WFD. In addition, it is the hope of the project team that the members of WFD use the information contained within this document to improve the effectiveness and efficiency of the services they provide such that the system is sustainable well into the future.

Appendix I - Apparatus Condition Chart

Excellent	Like new condition. No body or paint defects. Clean compartmentation. Interior cab complete, in full working order with no modifications. No significant defect history. Age is less than 25 percent of life expectancy.
Good	Body and cab have good appearance with no rust and only minor cosmetic defects or dents. Clean compartmentation with no visible rust or corrosion. Interior cab is in full working order and good appearance. Normal maintenance history with no significant defects or high downtime. Age is less than 75 percent of life expectancy.
Fair	Body and cab have weathered appearance with minor surface rust and some cosmetic defects or dents. Unimpeded compartmentation with only surface rust or corrosion. Interior cab is in reasonable working order and appearance. Only repairable tank or plumbing leakage. Showing increasing age-related maintenance, but with no major defects or unreasonable downtime. Age is less than 100 percent of life expectancy.
Serviceable	Body and cab have weathered appearance with surface corrosion, cosmetic defects or dents, and minor rust-through of non-structural metals (body panels). Unimpeded compartmentation with significant surface rust or corrosion and/or minor rust-through (not affecting use). Interior cab is in rough, but working order, often with local repairs or modifications to compensate for problems. Occasional or intermittent tank or plumbing leakage. Showing increasing age-related maintenance, but with no major defects or unreasonable downtime. Most service parts still available. Age is greater than 100 percent of life expectancy.
Poor	Body and cab have weathered appearance with surface corrosion, cosmetic defects or dents, and visible rust-through of non-structural metals (body panels). Significant rust or corrosion is present in structural or support members. Use of compartmentation is impeded with significant corrosion and rust-through. Interior cab is in rough condition with defects impeding safe and proper use. Non-repairable tank or plumbing leakage. Problematic age-related maintenance, major defects, or unreasonable downtime are evident. Service parts difficult or impossible to obtain. Age is greater than 100 percent of life expectancy. Vehicle exceeds its GVWR.